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3D Artist

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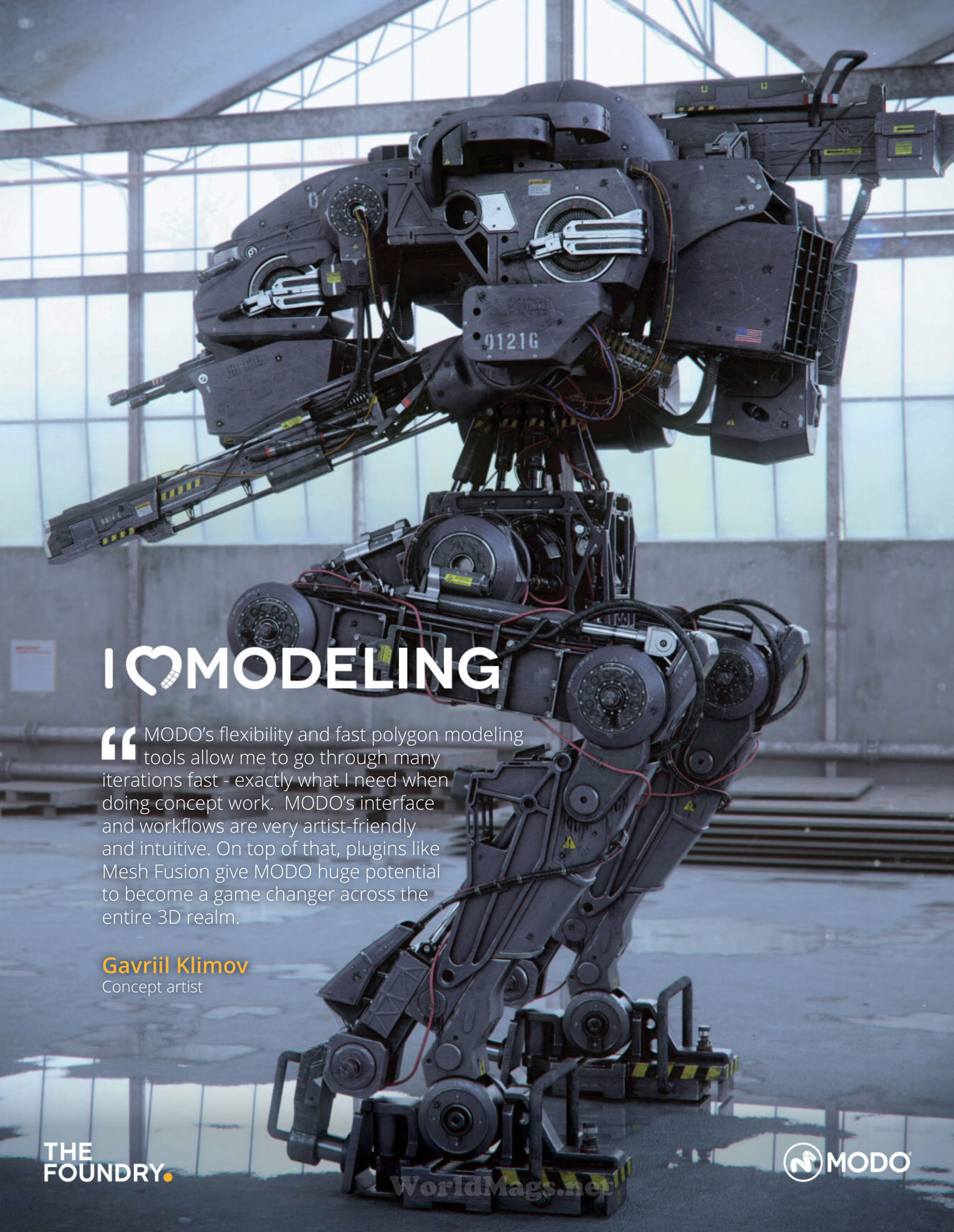

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"MODO's flexibility and fast polygon modeling tools allow me to go through many iterations fast - exactly what I need when doing concept work. MODO's interface and workflows are very artist-friendly and intuitive. On top of that, plugins like Mesh Fusion give MODO huge potential to become a game changer across the entire 3D realm.

Gavriil Klimov
Concept artist

THE FOUNDRY.

MODO

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> Each time you're adding support material it takes longer to print, so you have to be really smart about orientation

iMakr's Kirby Downey discusses his approach to designing for 3D printing **Page 45**

Autodesk Ember

Join the 3D printing revolution page 40

WorldMags.net

Sculpt a monster in ZBrush **Page 50**

Welcome

To the magazine and 100 pages of amazing 3D

Welcome to **3D Artist**! It's quite incredible just how quickly technology can move. 3D printing has been around since the Eighties, and yet it has taken until now for it to really start to break into the consumer market in a tangible way. Machines that would have cost you an arm and a leg a few years ago are legitimately affordable now, and as a result it makes perfect sense that this burgeoning industry will continue to grow exponentially.

Of course, there are myriad ways in which people are using 3D printing, be it for medical science, engineering or even printing in space, but this issue we are focused on one person – you. On p40 we have compiled a group test of five of the hottest printers on the market, followed by key info on different filament types and crucial 3D design tips. This is *your* chance to join the 3D print revolution.

After you've 3D printed everything from a shoe to a lifesize version of yourself (it'll take years but would be so worth it), don't forget to check out all the other amazing tutorials in the mag, all brought to you by some of the world's most talented artists! These include a NUKE masterclass on p64, macro techniques in Octane on p68, a Corona blowout on p72, Maya on p76 and LightWave on p78. Let's crack on...

Steve Holmes, Deputy Editor

Sign up, share your art and chat to other artists at **www.3dartistonline.com**

Get in touch... 3dartist@imagine-publishing.co.uk @3DArtist Facebook.com/3DArtistMagazine

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The Expert Panel

This issue's team of pro artists...

JAMES SURET
zerojs.cgsociety.org

Kicking off our tutorial section, James reveals how to create an incredibly detailed bloodsucking monster in ZBrush on p50. Head to FileSilo to download a 3D-printable monster bust for yourself!
3DArtist online username zerojs

ILIYA ATANASOV
www.pixelhunters.com

The co-founder and studio director of Pixelhunters teaches you how to orchestrate and render a robot battle scene on p56, following the release of the studio's short film 'LIFE'.
3DArtist online username n/a

PAUL CHAMPION
ncca.bournemouth.ac.uk

Paul has provided us with his NUKE and Photoshop expertise once again. This issue, he teaches you how to master multiplanar compositing, using his own photos to create a wonderful scene.
3DArtist online username n/a

ERIC KELLER
bloopatone.com

Have you ever wondered how to replicate macro photography using 3D software? Eric Keller is on hand to show you how, using Octane for Maya in his in-depth tutorial on p68.
3DArtist online username n/a

PETER ANG
dartofang.com

Peter has used Corona to render some awesome realistic glass in his tutorial on p72. First off, though, he teaches you how to model his amazing, colourful crunch cups in 3ds Max and ZBrush.
3DArtist online username cgdigi

LORENZO ZITTA
zittart.com

LightWave expert Lorenzo goes over the finer points of creating an authentic slimy texture for a snail, as well as showing you how to model a detailed body and shell using ZBrush on p78.
3DArtist online username n/a

JOCHEM AARTS
jochemaarts.com

The winner of last year's Humster3D car competition reveals how he used Maya, Mudbox and Photoshop to texture an old-school American hotrod. His tutorial is over on p76.
3DArtist online username jochem

SIAMAK ROSHANI
siamakroshani.com

Siamak developed the character model used in Iliya Atanasov's robot battle scene tutorial, and what a model it is. Head over to the tutorial on p56 to find out how he made it.
3DArtist online username n/a

ORESTIS BASTOUNIS
twitter.com/mrbastounis

Our tech warlock Orestis has had his mitts on two workstations this month – the powerhouse that is the Lenovo ThinkStation P900 and the mid-range HP Z440.
3DArtist online username n/a

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50 Cinema 4D tips & tricks

"Use Shrink Wrap to wrap geometry around mesh. It automatically forms new low-res geometry to the shape of your mesh"

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Sculpt a monster

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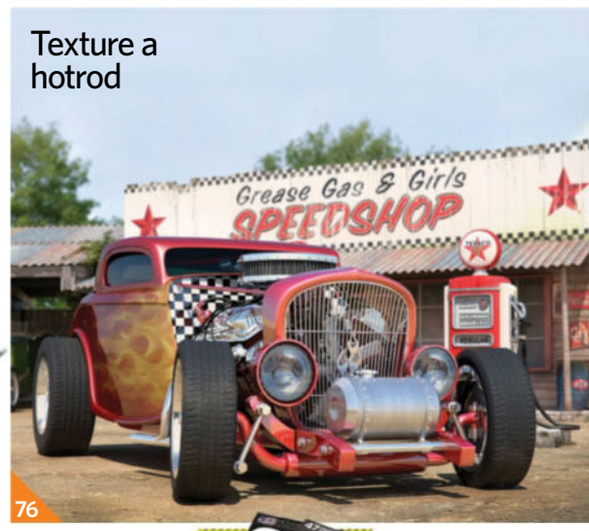

Texture a hotrod

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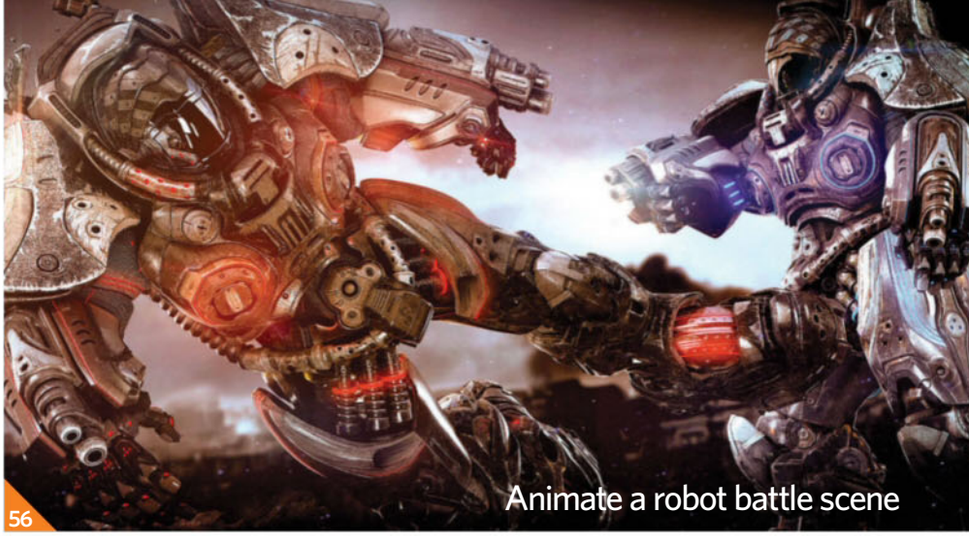

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- 25 Textures from 3DTotal

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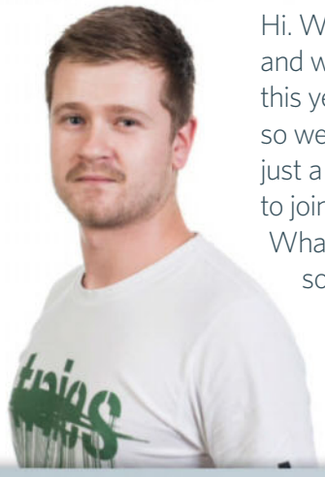
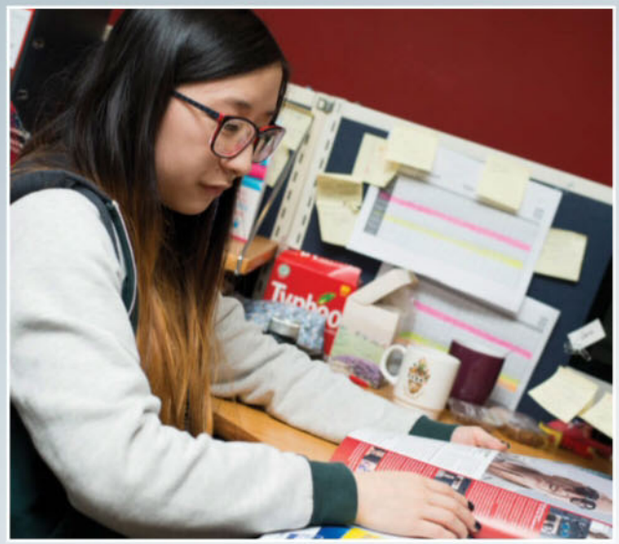
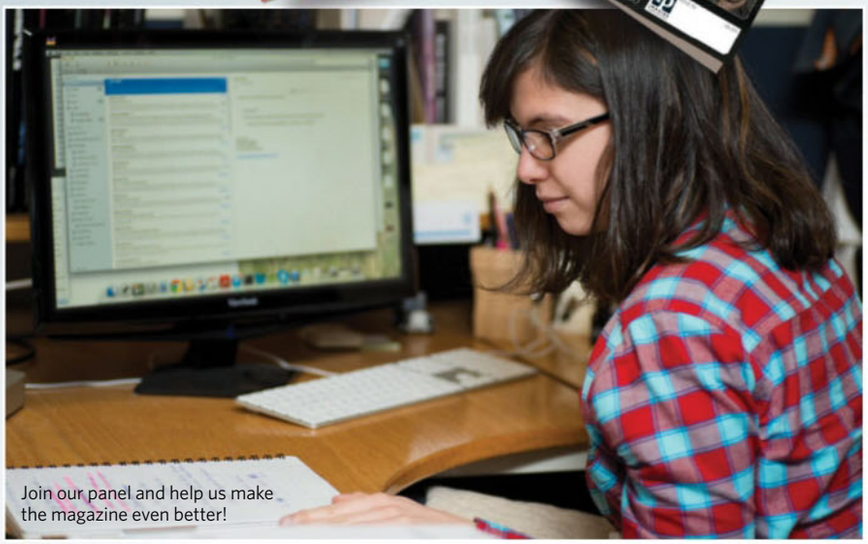


Hi. We absolutely love making 3D Artist and we hope you love reading it too. But this year we want to make it even better, so we're asking for your help. By answering just a few questions, you could be selected to join our first ever 3D Artist panel.

Whatever your skill level or discipline, I'm so excited to hear what you have to say about our CG coverage and can't wait to learn more about you.

Steve Holmes
Deputy Editor





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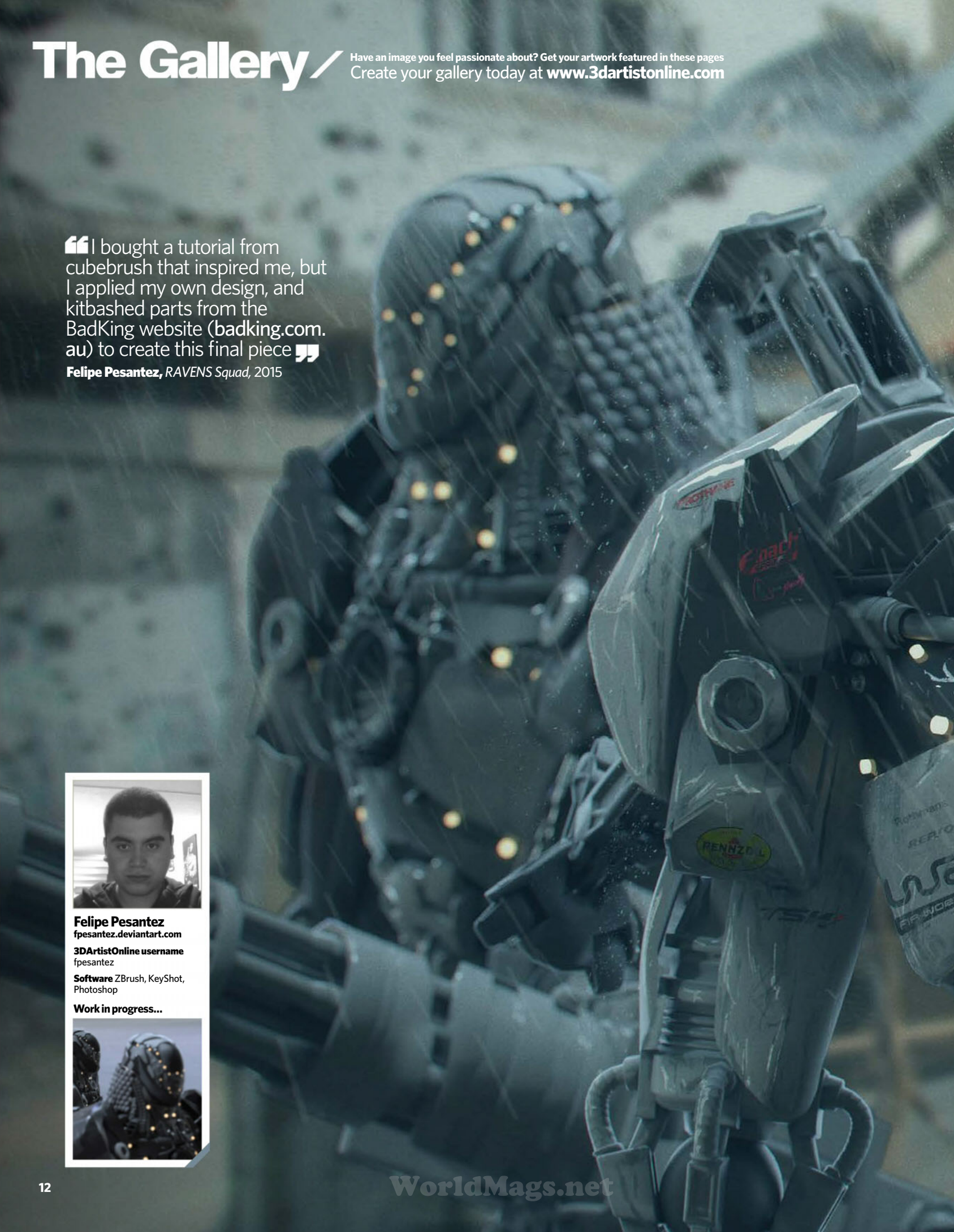

> I bought a tutorial from cubebrush that inspired me, but I applied my own design, and kitbashed parts from the BadKing website (**badking.com.au**) to create this final piece

Felipe Pesantez, *RAVENS Squad,* 2015

Felipe Pesantez
fpesantez.deviantart.com

3DArtistOnline username
fpesantez

Software ZBrush, KeyShot, Photoshop

Work in progress...

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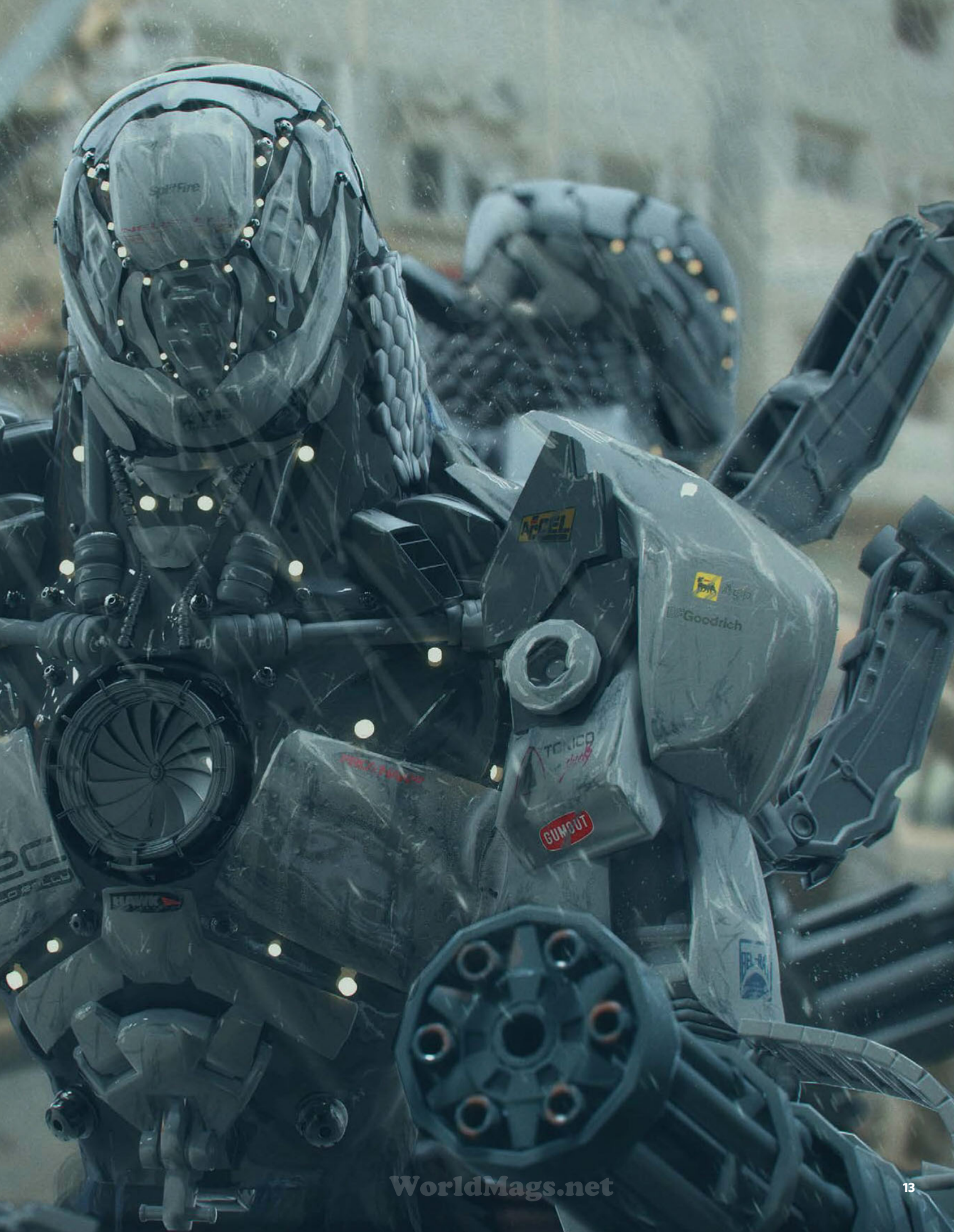

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> The main objective was to re-create an interior that was found on IKEA's website. This was also an opportunity to improve my modelling skill with Marvelous Designer

Alexandre Jarek, *The home of inspiration IKEA,* 2014

Alexandre Jarek
alexandrejarek.com

3DArtistOnline username: ajarek

Software 3ds Max, Marvelous Designer, V-Ray, Photoshop

Work in progress...

3dworldmags.net

Martin Houra
gravy.cz

Martin is a 26-year-old polygon pusher from Czech Republic, now based in Australia

Software 3ds Max, Corona, Frost, Photoshop

Work in progress...

"I have always wanted to do a CG version of still life and try Corona in the process. In the end it was a perfect choice"

Martin Houra, *Roses, pomegranate and a baseball bat (Still Life),* 2015

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Sameth Sim
samethsim.com

Sameth recently graduated and is a 3D artist who specialises in modelling and texturing

Software Maya, ZBrush, MARI, Photoshop, V-Ray, Shave and a Haircut, UVLayout

Work in progress...

"This image is based off of a painting by Dan Dos Santos. V-Ray Rectangular Light was used to set up modified three-point lighting for the character and I placed an extra light to illuminate her face"

Sameth Sim, *Lady Assassin,* 2015

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“This is a revamp of a rendering I did in 2003. Take an old scene, brush it up and see what you can do today. It’s quite rewarding”

Torsten J Postolka, *Rocket Bot,* 2014

Torsten J Postolka
pixelquarry.com

Berlin-based 3D artist Torsten started using 3D in 1998 and is still very passionate about it

Software 3ds Max, V-Ray, Photoshop

Work in progress...

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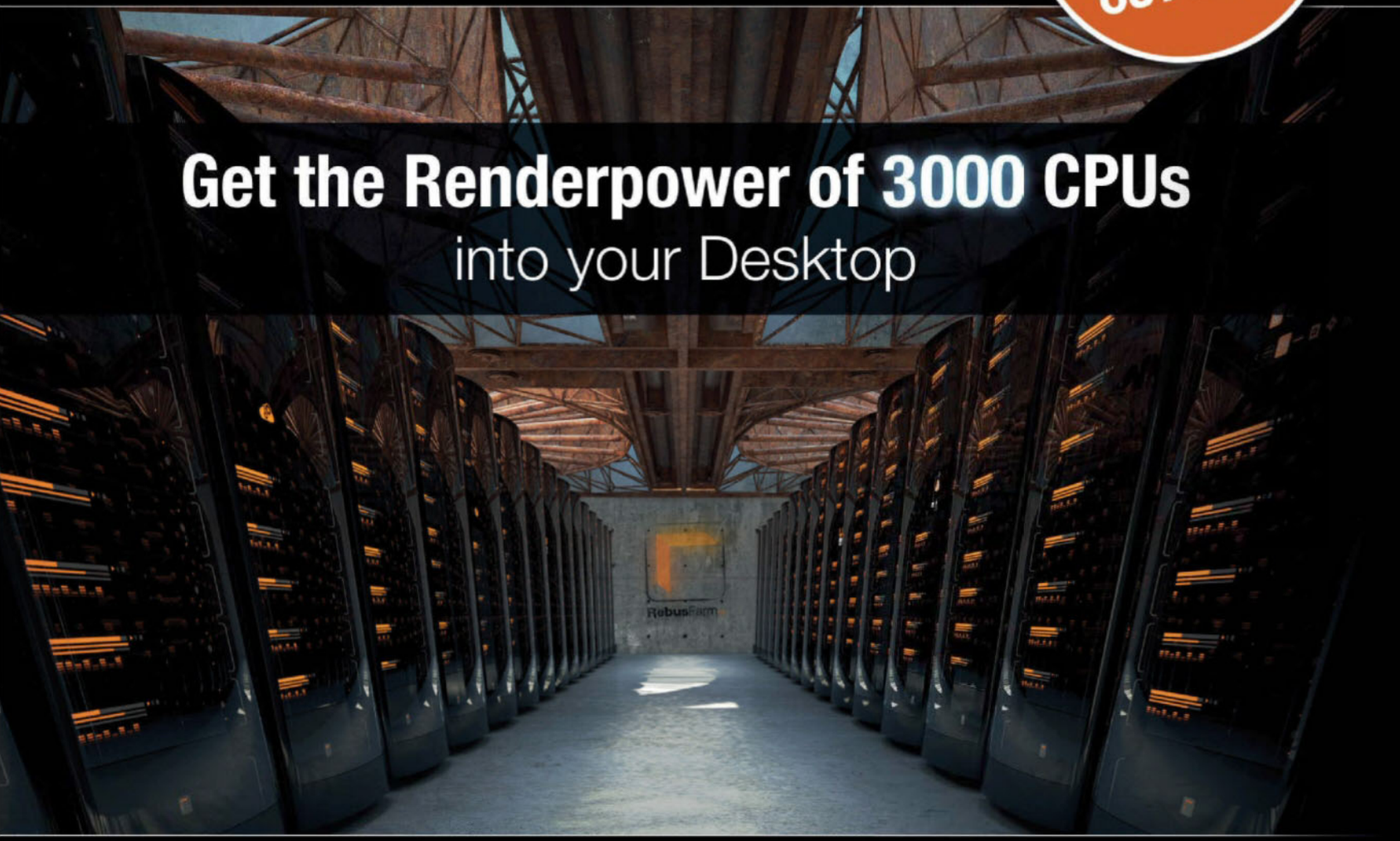

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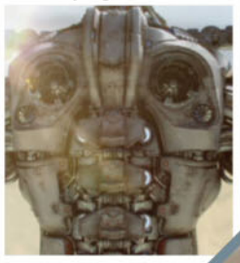
Tor Frick
torfrick.com

Tor is a 3D generalist working in the games industry as art director at MachineGames

Software MODO, Photoshop

Work in progress...



> This is a project I started a couple of years ago as a modelling exercise, but only recently picked up and finished. The original idea was to emulate a cinematic shot of some kind of robotic nomad walking through the desert

Tor Frick, *Robot Wanderer,* 2015

COMPOSITION
LEFT I was experimenting with quick ways to texture high-poly renders, and for this image I went with a combination of autogenerated occlusion-based masks for dirt and camera-projected UVs.

BACKGROUND
BOTTOM For the backgrounds in all the images I intentionally went with a very dusty, foggy out-of-focus look to save time – a combination of very quick matte painting and simple rendered shapes.

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> Something about desert landscapes always resonate with me, and I love the colour palette. Very Tattooine-inspired

Tor Frick, *Robot Wanderer,* 2015

MODELLING
RIGHT As this was originally a modelling exercise I didnt opt for a lot of textured or displaced details, but modelled everything in subdivisions. The added benefit was that texturing using shaders was easier.

POSTPROCESSING
BOTTOM I used heavy depth of field and dust effects for the background, and then grain and image artefacts to hide the transitions. I also made simple depth-based fog in Photoshop to sync the render with background.

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Model by Steve Talkowski
http://sketchbot.tv

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Technique focus

Incredible 3D artists take us behind their artwork

RENDERING I went for a multipass workflow using the ZBrush BPR renderer. Instead of rendering a flat beauty render, I rendered 14 different render elements and lights manually. I set the direction on the current light, rendered that, exported, then went to the next light or element. Don't forget, you can store and export render-view angles with ZAppLink.

Jonas Bergholm
jonasbergholm.se
3DArtistOnline username
blush

Software ZBrush, Photoshop

Demon, 2014

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 Alone on the Road by Bastien Grivet

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Industry experts reveal the secret tools, techniques, scripts you need to achieve incredible CG results

In 1990, a teenager named Philip Losch and his brother Christian entered a monthly competition run by MAXON's Kickstart magazine. The entry was their very own ray tracing software for the Amiga platform and it promptly won.

Soon after, the brothers were hired by MAXON itself, and for good reason: they had developed the beginnings of what we know today as Cinema 4D.

Now in its 16th release some 22 years after first becoming commercially available, it's easy to see what's made Cinema 4D so special for so long. For many artists, it's considered one of the easiest professional CG software packages to learn and the ideal tool if you want to incorporate 3D imagery into graphic and motion design for the first time. Cinema 4D is much more than a simple motion graphics tool, however. Throughout the years, it's also been used in a huge variety of other projects, including everything from television series, movies, games, and medical animation to architectural visions printed in 3D.

To find out more about what makes such an incredible piece of software run, we asked 13 professionals who use Cinema 4D every day for their tips, tricks, and secrets to instantly improve your workflow. Here's to another 22 years!

WorldMags.net

EXPERTS

JOEY CAMACHO
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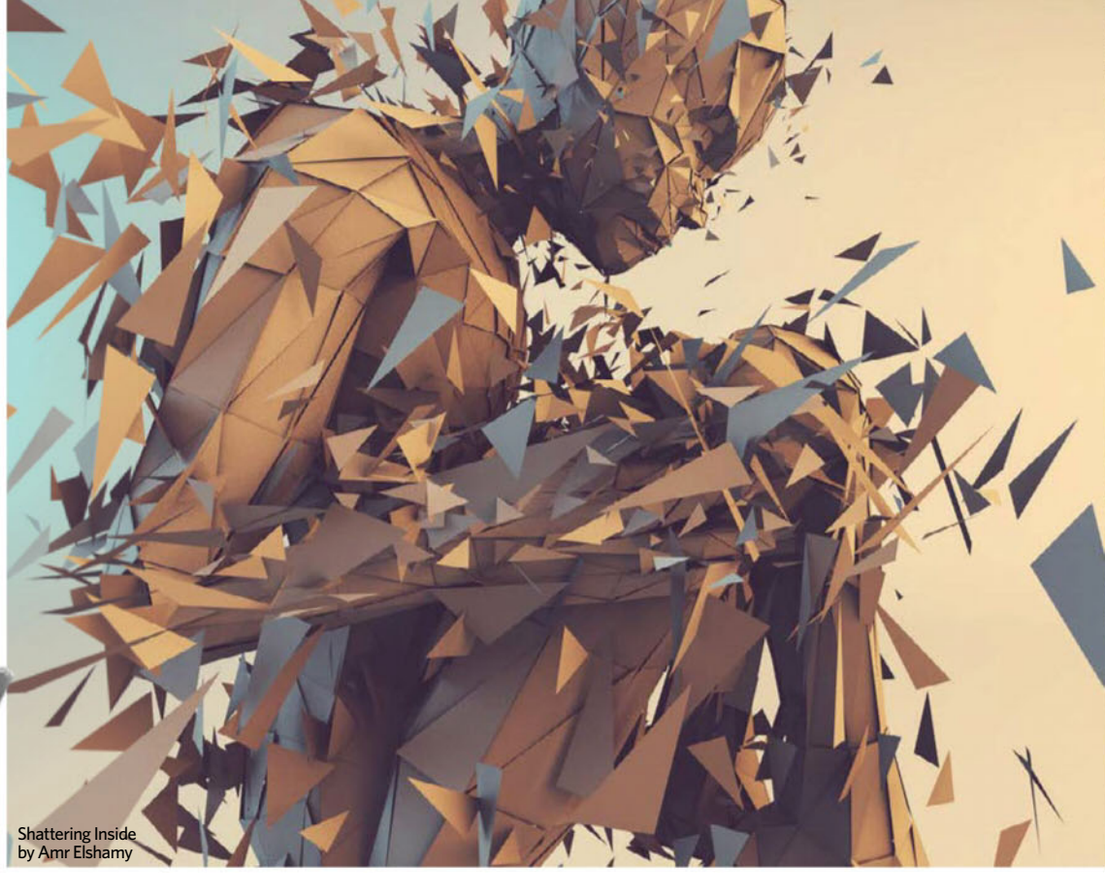
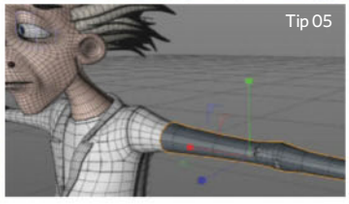
3D designer

Mech Drone work in progress by Paul Massey

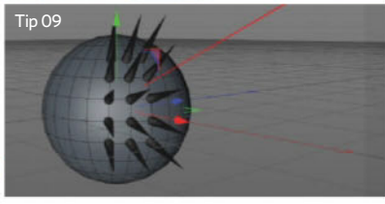


Shattering Inside by Amr Elshamy

Tip 07



Tip 05



Tip 09

STARTING RIGHT

01 Use real world references when you are making real objects Rather than imagining what something might look like, find out what it actually looks like, that way you can visualise the shapes and textures that real world objects might have. Reference images are very powerful as they can create convincing end results in a short amount of time. **Joey Camacho**

02 Remember shortcuts Some of the best shortcuts simply help you move fast. To get to Project Settings simply enter Cmd+D for Mac and Ctrl+D for Windows, or for Render Settings use Cmd+B for Mac and Ctrl+B for Windows. **Amr Elshamy**

03 Utilise Scroll to First Active This tool is used in every one of my Cinema 4D customised layouts. In a heavy scene it can really slow you down trying to locate a part of your job in the Object Manager. Instead, simply click on the object in the viewer window and click on this icon. It will instantly select the object and scroll to it in your Object Manager. **Paul Massey**

MODELLING

04 Set the origin point in preparation for a new Extrude object Want to drop an Extrude, Loft, Sweep or MoGraph object into some splines or other objects you've made, but don't want that object's axis to be in the world centre? With the splines you want to modify selected, hold down Alt to force the Extrude, Loft, Sweep or MoGraph object to originate where your other object's axis is. **Digital-Tutors**

05 Retopologise faster with the help of Shrink Wrap When you have a simpler shape like an arm or leg that needs to be retopologised, you can drop in a very basic primitive like a cylinder, and use Shrink Wrap to wrap the geometry around the mesh. It automatically forms the new low-res geometry to the shape of your mesh, making the retopologising process a whole lot faster! **Digital-Tutors**

06 Model organic forms with the adaptive sculpting tools Cinema 4D's sculpting tools, while not as in-depth or advanced as a dedicated sculpting program like that of ZBrush, offer great solutions to creative ideas. The ability to use these sculpting tools with a Wacom tablet, along with that of Photoshop brushes and presets for paint or stamp textures, makes for very interesting results. **Joey Camacho**

07 Create realistic droplets To create realistic droplets, like those on a bottle, I model a variety of drops, which will then be distributed with Cinema 4D SurfaceSpread. They don't need to be high poly – simply pull and push some vertices until you get the desired look. In my case I had five types, the smallest of which were cloned 4,000 times. **Michael Tschernjajew**

08 To make a cool design you don't always have to use a pen Simply block out some basic shapes and enable Cinema 4D's enhanced OpenGL preview in your viewport. Make sure you enable shadows. **Michael Tschernjajew**

09 Adopt the Clone tool in your work and quickly put objects on a surface You can use the Clone tool to put objects on the surface of another object. The Surface tool picks the surface of the object and splits it. Cinema 4D then generates a new split surface mesh. Add a new object beneath the Clone object, then set Clone mode to Object, which is the split surface mesh. You will now see that your new object is added on the surface you picked. You can also add a random effector to make this look more natural. **Zeng Xiaolin**

10 Boolean operations Using Booleans can be a pain as they will easily make a mess of your model. If you must use them, select the area of your object that you would like to Boole and section it off, either with an Extrude Inner or by simply using the Knife tool. This will isolate the area that the Boole will add polygons to, making cleaning up your mesh much faster. **Paul Massey**

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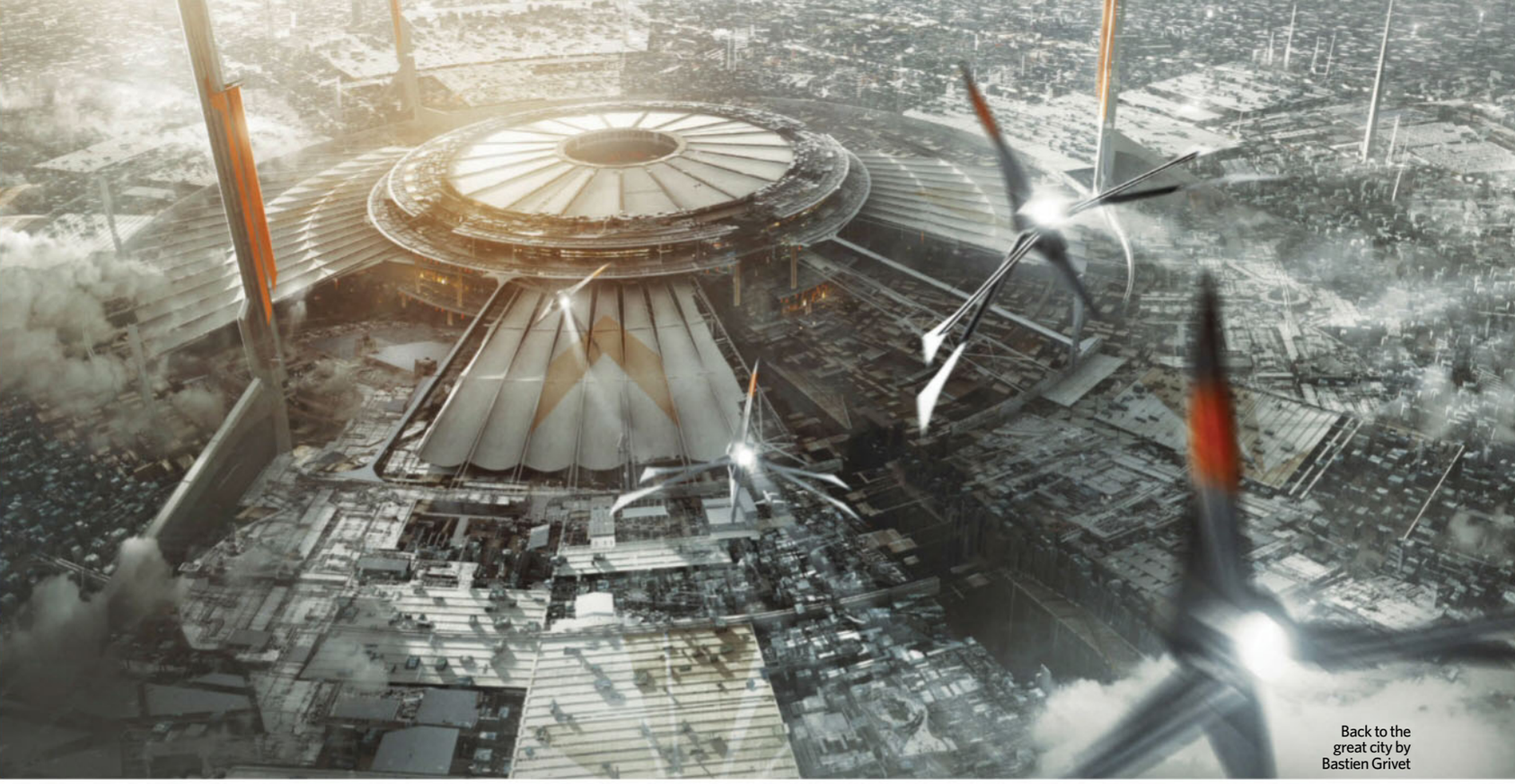

Back to the great city by Bastien Grivet

SHADERS AND TEXTURING

11 Find other texture resources that are readily available online My two principal website sources for textures are CG Textures at **cgtextures.com** and Swiss Landscape Resources at **gumroad.com/slresources**. Swiss Landscape Resources is a small platform of photo materials that are really great for amazing landscapes at a very affordable price. **Bastien Grivet**

12 Accentuate your models with edge breaks The Phong Shading Tag gives an object a smoother appearance. Selecting certain edges and breaking the Phong shading there can accentuate different material qualities of the model. **Erwin Kho**

13 Add dirt without having to unwrap a complex mesh If you want to add dirt to a model but don't want to mess around with UVs, you can stack textures with Alphas on the detached geometry of your original mesh. Using Cinema 4D's Live Selection Tool, pick some polys – then use the Mesh Split command. Do this as many times as you like, and keep varying them by adding different Alphas and Displacement attributes. This is faster than unwrapping a complex mesh, and you will get a fairly good result. **Michael Tschernjajew**

14 Try C4D's Vertex Map Shader. C4D's Vertex Map Shader enables you to render a Vertex Map as a greyscale image. To end up with the proper greyscale output, apply the Vertex Map Shader in the Alpha and Luminance channels. Assign the Vertex Map weights you made to the Vertex Map Shaders and you're done. **Erwin Kho**

15 Achieve better noise colour with Colorizer Noise shaders only have two colours, but you can add extra colours with a colouriser shader. Select Colorizer in the drop-down menu on the left of your noise, as if you wanted to replace the noise with another shader. Instead of replacing it, the noise will be placed in the Colorizer shader. Now you can add a full colour gradient to the grey values of the noise. **Istvan**

16 Create your own texture library and regularly add your own bespoke resources to it I'm always going back to my good old home-grown texture library – I've got my Canon 7D with me most of the time for this purpose. Usually I try to keep my library organised. **Axel Roessler**

17 Link the properties of two shaders with the XPresso editor Create an XPresso tag on a Null object. Drop a master noise shader and a slave noise shader on the XPresso editor. Link each output from the master noise shader to its corresponding inputs in the slave noise shader. Now, changing a parameter on the master noise will update the slave noise in real-time. This works for every type of shader, not just noise. **Istvan**

18 Select texture tags or objects to quickly change materials Rather than scrolling through the Object Manager trying to locate each individual model that shares the same material, click on the material in the Material Manager and LMB and choose 'Select texture tags/objects'. You can then drag your new material into the Texture Tag>Tag Properties>Material slot and all the materials will be updated. **Paul Massey**

19 Create a glowing edge effect with the Fresnel texture If you have a complex model, add a Fresnel to it and leave the background black for a nice glowing effect. **Zeng Xiaolin**

20 Work with Fresnels on reflective surfaces When you need a reflecting surface, you can use the reflectivity channel. In order to make the reflection transparent, an option is to just lower the opacity of its layer inside the material. However, it will be best to use a Fresnel layer for the reflectivity reduction, as this will create more natural reflections. **Uli Staiger**

21 Get more realistic edges with Fresnels If you've used a Fresnel in reflections and want a more realistic result, add that same Fresnel in the Color channel and invert it. Then set Mix Mode to Multiply. Without this trick, your edges will have a brighter colour than they should. **Philipp Pavlov**

22 Default Cinema 4D noises looking too obvious on your model? You can use the Distorter effect with two different noises. This will generate a lot of interesting organic textures by distorting existing noises. **Philipp Pavlov**

23 Avoid having too many Ambient Occlusion render effects Have you ever used a material such as glass in your scene and wondered why it may have rendered dark instead of rendering as transparent? You probably used Ambient Occlusion as a render effect. Grab the Composition Tag for the glass object and click 'not visible for AO'. **Uli Staiger**

24 Utilise the Normalizer Pure black-and-white images are used in the Bump channel. The Normal channel creates more detailed surfaces, but it needs a normal map. So load the Normalizer into the Normal channel and feed it with your black-and-white image. Reflections and specular lights will now look a lot better. **Uli Staiger**

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RIGGING, ANIMATION AND MOTION GRAPHICS

25 Avoid rerendering by baking your animation If you've used the 'Align to Spline Tag' to create a camera or light animation, and you plan on compositing the shot in After Effects after you've rendered, make sure that you bake your animation to a copy before you render! This will save you from having to go back, bake and reimport, or worse rerender! **Digital-Tutors**

26 Baking your animation to stabilise Constraint Tag results The Constraint Tag in Spring mode will generate a slightly different animation each time. To avoid this, you have to bake this animation into keyframes. Drag and drop the object that has the Constraint Tag onto Timeline and go to Functions>Bake Objects then click OK. Now each time you run your animation, it will look the same. **Philipp Pavlov**

27 Reduce flickering in rendered animations When rendering an animation that has lots of shiny reflections on edges with the standard renderer, make sure to use the Gauss (Animation) setting under Anti-Aliasing>Filter. This will greatly reduce flickering in the animation! **Digital-Tutors**

28 Easily track arcs and observe spacing Tracking arcs is important for animation, and luckily tracking arcs in Cinema 4D is extremely simple. You can use the motion path of the animation to not only track the keyframes, but also each frame in the timeline, even if you don't have a keyframe set. This enables you to see the arcs of your animation as well as the spacing between each frame in the animation. **Digital-Tutors**

29 Change a clone instance by proximity with an object First, create a cloner with several types of objects as children. Create a Shader Effector. On the Parameter tab, disable all transformations and set Modify Clone to 100 per cent. On the Shading tab, select the Proximal Shader. Click on the Proximal Shader to open its parameters and drop an object on the Objects field. Now as the clone goes near the object, it will be replaced successively with each cloner child. **Istvan**

30 Use Delay Effector to get some more natural animation If you have moving, scaling or rotating objects, and want them animated more naturally, use Delay Effector. Put the animated objects beneath a Fracture object, and add a Delay Effector to the Fracture object. **Zeng Xiaolin**

31 Using keyframe selections To save your animation timeline from becoming cluttered, select the object you wish to keyframe and click on its coordinates tab. You can then select its x, y, or z (or all three) then LMB and click on Animation>Add Keyframe Selection. This way only those position coordinates will be added to the timeline, so you won't get keys that aren't required. This also applies to keyframing the Scale and Rotation. **Paul Massey**

32 Avoid altering existing animation Want to try other keyframe animation on an object, but don't want to disturb or modify any existing animation? Easy! Select any curves or keyframes on the Timeline and then go to F-Curve> Create Snapshot. Now you can change your animation, create one more snapshot and then you can swap between them to see which is best. You can even view all your snapshots on the timeline simultaneously. **Philipp Pavlov**

33 Use Nulls for random moving lines Simply put many Null objects in a sphere, (the position of Nulls can be random), and add all Nulls to a Tracer object. Animate your sphere, and you will see some nice lines moving behind it. Now, disable the sphere's visibility. **Zeng Xiaolin**

SCRIPTING AND DYNAMICS

34 Generate powerful particle simulations with X Particles X Particles is a particle simulation plugin that really feels integrated and intuitive. Its power lies in how quickly you can create interesting forms with many particles and easily change them using deformers and effectors. It also has a Skinner object that can attach particles, creating a 'skin' for fluid-like shapes. **Joey Camacho**

35 Get access to creative solutions with Cinema 4D's hair module Cinema 4D's hair module is a great tool. By using selections and adjusting the parameters of the hair shape, and then adding a material with subsurface scattering, you can use the particle deformers on the hair – wind, turbulence and more – to get lifelike movements and arrangements. **Joey Camacho**

36 Baking Dynamics If your dynamics animation is slow to view, you can use Baking Dynamics to help. Just Ctrl/Cmd+D, then go to Dynamics>Cache then click Bake. This will bake all the dynamics in your scene and let you view them in real-time. **Amr Elshamy**

TOP C4D SCRIPTS

with Cornelius Dämmrich

LAYER TO CHILDREN

christian-behrendt.com/pages/downloads

It basically attaches the layer from the parent object (eg a Null object) to all of its children. Without the script you would have to select the children by hand and attach them to the layer you want – this is also very easy, but Layer to Children is way faster.

POINTS TO CIRCLE

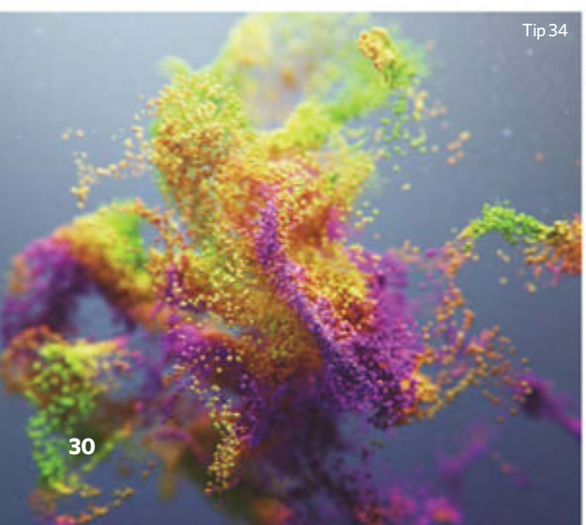
bit.ly/18JiDRS

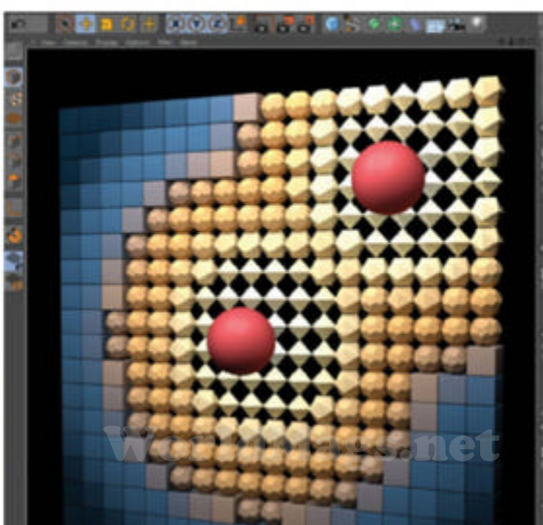
3DKiwi from **c4dcafe.com** posted this script in a request thread and that's how I found it. It's the most time-saving little helper I have ever used, a must-have for every modeller. You select the boundary loop of a hole (take a look at **www.evoleeq.com/eimer/screenshot/2015-02-05_181344.jpg**) and just execute the script and it makes a perfect circle with the selected points (**www.evoleeq.com/eimer/screenshot/2015-02-05_181511.jpg**).

SMART POLYCHART

bit.ly/1wQjFAG

Smart PolyChart is a plugin that works by making a chart containing every poly object in your scene, beginning with the high polygon objects. It's a good little helper if you have big scenes and want to optimise using them.





Luftschiffer by Uli Staiger

Satellite, personal project by Philipp Pavlov

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RENDERING ARCHITECTURE

with Axel Roessler

DOLLHOUSE

Lots of my personal work is influenced by mid-Century aesthetics – dollhouses reflect the past in a very special, microcosmic way. This render is based on a dollhouse from the Fifties in the former German Democratic Republic.

During modelling, there's always the question of how detailed the whole scene should get, so I put myself in the role of a toy designer who has to live with the limits of the real setting. Texturing was the real fun part of this project. It was colour graded later in Photoshop.

CONTEMPORARY COLORS

The light setup was the hardest part of this image – every floor including the roof has its own big soft box light from the Greyscalegorilla Light Kit (**bit.ly/1FytUOE**). For the finished image, I had to render all three floors separately and combine them later in Photoshop, as there was no way to tell the soft boxes to light just a selected floor.

To avoid the convergence of parallel lines from the walls to the right and left, the shift camera included deep inside Cinema 4D's presets was used. An expression will work by controlling the camera's settings, and this can be seen in action in the screenshot above.

PALOS VERDES PENINSULA CENTER LIBRARY

This was a beautiful building by Quincy A Jones, located in Los Angeles. My render imitates the original photograph of the library's courtyard reading room, shot by Julius Shulman.

The real challenge while setting up the scene was the lighting. After some experimentation I decided to imitate the real setup: light in this scene only comes from the outside – so the outside photo generates GI, and a physical sun is included too. When I started with V-Ray these options seemed confusing, but the combination of the Specular Layers in particular is one thing I don't want to miss at all.

LIGHTING, RENDERING AND POSTPRODUCTION

37 Experiment with your camera's settings Changing your camera's focal length and sensor size will change how your scene looks completely, so play around with those settings and be creative. **Amr Elshamy**

38 Explore the power of planes Placing a big white plane over your object will help you get cool reflections. You could also use it as a soft light source by making the Luminance of the plane material white or any colour you like. **Amr Elshamy**

39 Master Global Illumination and V-Ray With photorealistic rendering, in my opinion there's no better way to go than using Global Illumination with V-Ray. Especially if metals and glass are involved, the results have this special crisp touch that the standard renderer just doesn't generate. **Axel Roessler**

40 Understand light with HDRIs My process for lighting scenes usually relies on the power of image-based lighting (IBL) with HDRIs. I often like to get out and capture my own HDRIs, as it gets me away from the computer and lets me explore outdoors. **Joey Camacho**

41 Remember that coloured lights are better in Cinema 4D Your scene can look too clean when the colour of the light sources does not vary. Use greenish lights for neon tubes, slightly yellow for any kind of hot light and bluish for the simulation of daylight. **Uli Staiger**

42 Make objects appear more flat for a low-poly look with Ambient Illumination In this image I wanted certain parts to stand out more by, ironically, making them appear more flat. This was done by placing a light object with only its Ambient Illumination box checked. Ambient Illumination enables you to evenly light up all object surfaces, regardless of their angle towards the camera. By setting it to include only a specific object group you can constrain its effects. **Erwin Kho**

43 Save GI prepass pictures and animations without the final picture Go to the Global Illumination menu in the render settings. On the Light Mapping tab, set Mode to Visualize and then on the Cache File tab, check the Prepass Only checkbox. You need to specify a file output and check the Save checkbox in the render settings, or the Prepass Only checkbox will stay greyed. **Istvan**

44 Experiment by adopting nonphotorealistic rendering Sketch and Toon is Cinema 4D's NPR – nonphotorealistic renderer – which is a fun way to experiment with more traditional treatments like blueprints or a pen or pencil sketch. It's a fantastic tool to experiment with and create fun images quickly. **Joey Camacho**

45 Apply matte masks with Composite The Compositing Tag enables you to make any object into a Matte that can be used as an Alpha channel. Most objects could be simply rendered white, but for things like sand I like to fade away towards the edges. This can be done by applying a Vertex Map to the sand and then setting the required weights. **Erwin Kho**

46 Start GPU rendering with OctaneRender Cinema 4D's built-in Physical Renderer is fantastic, especially with the new release of R16. However, OctaneRender for Cinema 4D has provided me with the ability to preview my renders quickly, which is critical. It harnesses all of the GPU compute power so I'm able to tweak materials fast and see updates nearly in real-time. **Joey Camacho**

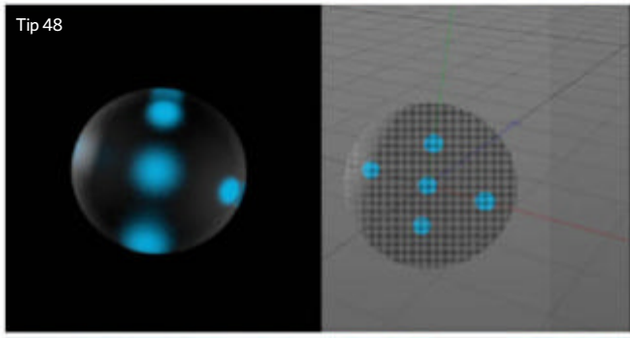
47 Render motion blurs Motion blur can look great, but will hugely increase render times. If your object is moving in a linear fashion rather than a loop or curve, then drop the motion subdivisions down to one. Only increase this in relation to the amount of loops or curves that you have to render. **Paul Massey**

48 Put self-glowing objects inside a transparent light penetrating object If, for example, you have a transparent sphere, then add glowing spheres inside the object, render it out, and you'll see glowing effects inside it. **Zeng Xiaolin**

49 Get more control over your Volumetric Lights by using material with Noise Assign a new Light material, check off all channels except Transparency, add Noise to Texture (Transparency>Texture), and set Visible Light to Volumetric in the Light settings. **Philipp Pavlov**

50 Take the time to set up your lights and render settings perfectly A little bit of Ambient Occlusion and activating the Global Illumination are the two things you have to do to achieve a good first render. Add a few parameters too like Anti-Aliasing and your render will then be ready to use. Good lighting, texturing and modelling will then lead to a good render and a lot of time saved too. **Bastien Grivet**

Tip 42


Tip 48

Tip 37

GREAT C4D PLUGINS

Need some snow? You can use the amazing free plugin Magic Snow for C4D by nitro4d. (**nitro4d.com/blog/freebie/magic-snow**). **Amr Elshamy**

I find the GSG Light Kit (**store.greyscalegorilla.com/products/light-kit-pro**) and HDRI Studio pack (**store.greyscalegorilla.com/products/hdri-studio-pack**) useful, especially for when I need photorealistic product shots. **Axel Roessler**

Plugins like Smart IBL (**hdrlabs.com/sibl/software.html**) can provide you with awesome solutions to lighting with HDRIs. **Joey Camacho**

For rendering I use the great VrayforC4D plugin. (**vrayforc4d.net/portal**) With the use of V-Ray's Depth of Field you will get nice results, which will make your rendered object look like a real-scale model. **Michael Tschernjajew**

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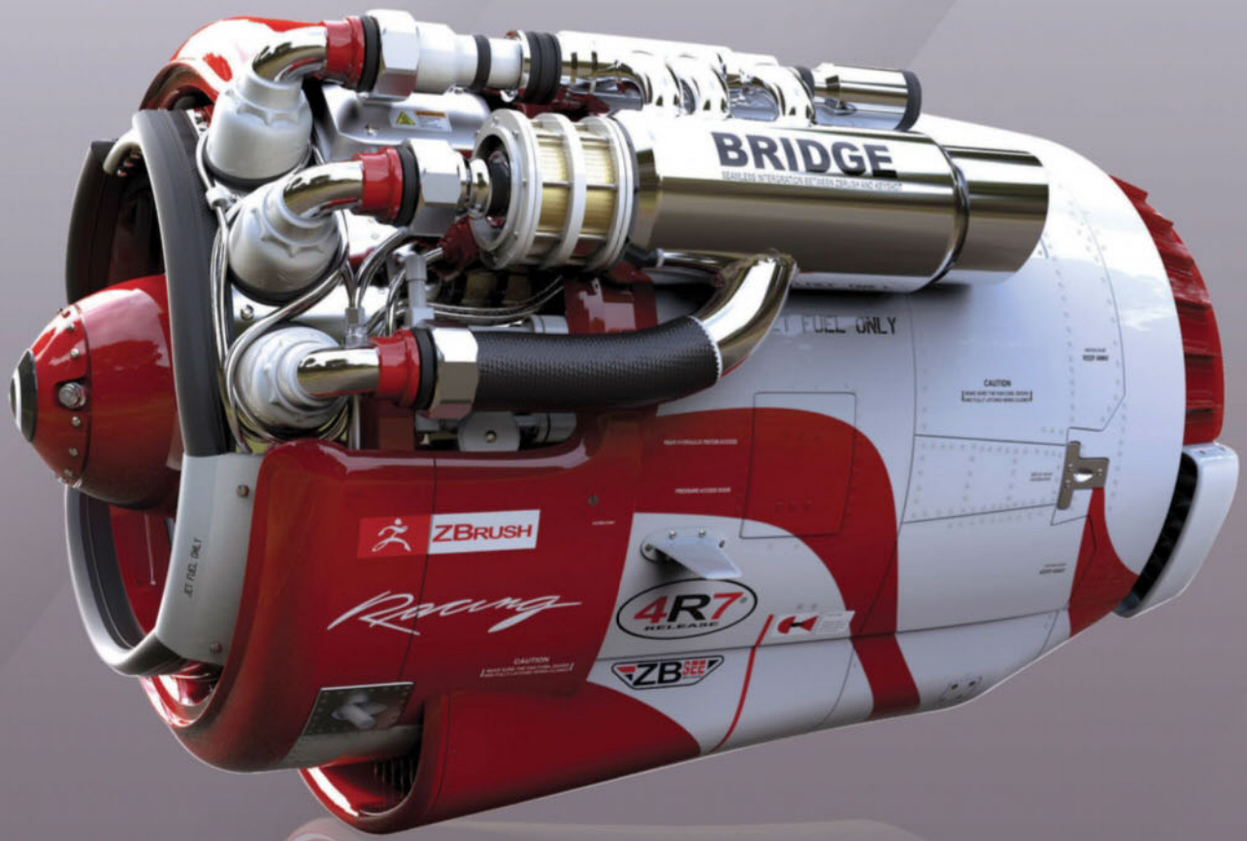

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DESIGNING THE ALIEN WORLD OF HOME

3D Artist goes behind the scenes on DreamWorks Animation's Home to find out how the celebrated animation studio breathed life into a different kind of alien

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The artists behind today's blockbuster animated movies can be considered the Dr Frankensteins of modern cinema. Not only are they responsible for composing some of the most memorable and spectacular imagery ever committed to screen, they're also the mad scientists conceiving, moulding and breathing life into creatures that usually live only in the realm of fantasies and dreams.

For DreamWorks Animation on *Home*, the challenge was taking a simple concept behind an affable race of extraterrestrial beings and creating a loveable character that felt tangible yet recognisably cartoony – which is easier said than done when the alien in question is a squat, six-legged creature that changes colour in tune with its current emotional state. "The Boov race literally wear their emotions on their sleeve," enthuses *Home*'s VFX supervisor Mahesh Ramasubramanian. "Every time they have an emotion their colour changes or ripple patterns appear on their body."

It's an impressive visual effect to behold, with the colour seemingly vibrating from within and out towards the surface as the Boov transition between feelings of happiness, anger, sadness and everything else on the emotional spectrum. Not only does it represent a playful quirk inherent to the species, but it's a fundamental narrative device to communicate how the relationship between *Home*'s two stars, Oh the Boov and a little girl named Tip, evolves throughout the film.

"It was fairly difficult to achieve. Not just visually but more so on the acting," says Ramasubramanian, highlighting the particular challenge it posed for animation and rigging. "Yes, the character changes colour but you've got to time it correctly to make it

> "We realised that there was something really nice about being simple"
>
> **Mahesh Ramasubramanian,** VFX Supervisor

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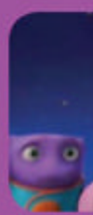
TOP Bubbles are a key tool for the Boov race – they use them to move around freely above ground

STRAP Given the complexity of the number of shot assets, Cider, a new set-directing toolset, was created



feel like a realisation. Sometimes our characters turn yellow with fright, and that's immediate. They're scared and they hit yellow in a beat. But something like sad is more complex. People feel sad for different reasons, like perhaps you lie and it takes a few moments before you realise you feel sad about it."

To perfect the effect of the Boov's emotionally-charged colour change, animation, effects and lighting worked meticulously in unison. The colour change would first be previewed in animation, and then refined in the effects department before lighting added the final subtle tweaks.

"We also used a lot of patterns," explains Ramasubramanian. "We had this shape language of our Boov characters, which were circles and we incorporated these very simple shapes that were curves, arcs or ripples of circles into the colour transitions. When they were really agitated we would then use harsher shapes like triangles."

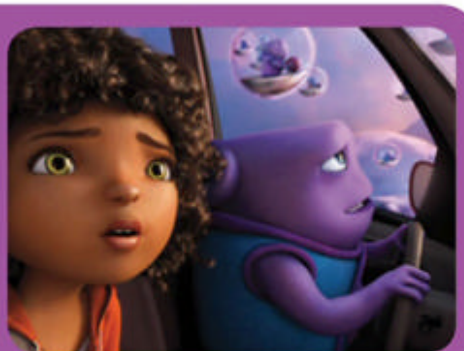
As a reference point, the team studied cuttlefish and the nature by which they alter their own colour in the wild. The process proved useful, not least in teaching the artists working on *Home* the perils of chasing realism. "One of the things about cuttlefish is they change colour really fast and it can feel fake," laughs Ramasubramanian. "It's so fast and so much is on the surface that it really surprised us. We put some development into replicating that, which resulted into some really pretty images with a lot of depth to the characters. But, when we played it in an animated scene it was just creepy. We realised after that [it was nicer] being simple."

That level of simplicity fed into other areas of the Boov's design, including the advanced technology that the aliens wield. Bubbles are used as weapons, as well as a way for the Boovs to pick up and shape things. Elsewhere a gravity ball enables them to tweak the laws of physics at will. Both are seemingly innocuous devices, but they work by communicating the cheerful nature of *Home*'s unique alien creatures to the big screen. "At nearly every moment in the movie you want to be reminded that the world has changed," says Ramasubramanian. "You might forget it when you have these intimate scenes with the characters but in the background you'll always see these world-altering (but also charming and surreal) landscapes filled with these floating objects. You might not realise what

Travel Guide

DreamWorks Animation tells us how it made the interior of a car exciting

The two heroes of the movie *Home*, Tip and Oh, spend much of their adventure confined to the inside of a flying car. This cramped setting posed plenty of technical challenges. "It was very interesting in terms of cinematography," says VFX supervisor Mahesh Ramasubramanian. "Shooting inside a car – there's never enough room, so you need to be able to turn certain parts of the car off or modify it." The team at DreamWorks Animation solved the problem by developing a new workflow called Hyde Park, which made the process of composing shots in and around the car less strenuous. "Layout or animation could turn parts of the car off or move parts and that would translate all the way through the pipe," he continues. "We wanted flexibility but also our director would want to limit the camera direction. Many times in a movie you'd turn off a seat or driver's side door to make it easier to compose the shot but this was more advanced... Animation and layout can control what lighting is seen in a scene." Hyde Park was so successful that Ramasubramanian and his team want to use it again, "Hyde Park was very important and something we'll be passing on to other shows."



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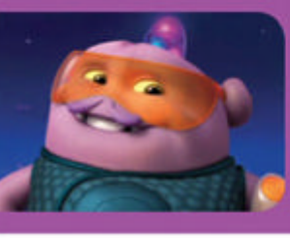
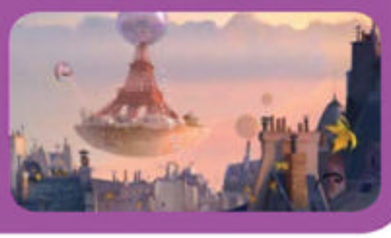
The studio developed its own software called Willow to deal with the complex hair sported by the characters in the film





it is or why it is, but you immediately realise that things have changed."

Ironically, one of the bigger challenges that the team faced on *Home* wasn't an alien concept at all but one that much of the world face on a daily basis. "The crowds in the movie are fairly complex," reveals Ramasubramanian. "When we started the movie we didn't expect it to be a crowd-heavy movie. As we worked on it we realised we had quite a variety of crowd situations. Not just our aliens but we have the villain's alien race called the Garg, and then there are humans and vehicles on the road. By the end we realised this was one of our most complex crowd movies. We didn't start off envisioning like that but we ended up with it being very heavy, not specifically in numbers with 100,000 people in one shot, but the number of shots that has crowds is nearly a third of the movie, meaning it has so much variety. It's important that it's a world-changing event and it's important that you realise who and how many have been affected."

> "By the end of the show we realised this was one of our most complex crowd movies"
>
> **Mahesh Ramasubramanian, VFX supervisor**

And with the stakes set so high within the movie and the entire world in danger, Tip and Oh's journey takes them to myriad recognisable destinations. By his own admittance, Ramasubramanian and the team conceived some crafty techniques to pack in so many locations into the movie. "We created one US city that has a downtown region with six streets," he reveals. "We shot at least four sequences there but every time it's fresh and new. [For one occasion] we were in a more commercial area where there were taller buildings, and right next door were these smaller residential houses where Tip lives. It was like a studio backlot.

"We made small sections and limited ourselves, and the director Tim Johnson was absolutely on board with these limitations. He thought the limitations would help us in how we told the story and think smarter about how we could achieve shots."

"Given the complexity of the number of assets we have in shots we created a new set directing toolset called Cider," he adds. "This software made it easier for us to create one set for a backlot and to make modifications in individual shots. You'd set something up for the whole sequence and then you could go to individual shots and move stuff around based on cameras, and the software would track that to the pipeline. It was another part I was really happy with as we didn't break the bank."

And happiness was fittingly the fulcrum of the film's production that drove the team forward, according to Ramasubramanian.

"In approximate numbers we had about 200 people working on it for two years," he says. "We headed out trying to make the best visuals while telling the best story. The artists have been really happy on this show. You might want to talk about the technical challenges and the rendering software we created but happiness was something we very successfully spread through the team, and we finished and everyone really enjoyed the process. That makes me happy. You have a lot of people working on a show for a long time and you want everyone to have a good time. I think we have and we'd love to be able to do it one more time."

Home is in cinemas now. For more information please visit dreamworks.com/home.

Interview **Jason Reisig, Home's head of character animation**

Tackling aliens and adolescents, Jason Reisig talks about the challenges of bringing Home's vibrant cast to life

What was the biggest challenge the animation department faced working on Home?

It would definitely be creating this new alien species: the Boov. It was finding that right balance of a very simple design that can be appealing and fun but also has that charm and emotion to it. We also had to figure out its nonhuman interactions that would translate visually. How do they use these weird tentacle things on their heads? How do they walk? How do they do human things as simple as waving and clapping, or is it something completely different? There was a lot of exploratory work at the beginning to try and figure out who these aliens were. It was a fun process but it took quite a while.

When it came to the human characters, what new techniques did you introduce to animation?

The hair on Tip is very cool. There was a lot of effort early on to give her really good hair that we didn't have to worry about all the time. A lot of the time hair can be an afterthought or it's one style. With Tip, she has this great curly hair. They didn't want her to have one hairstyle they wanted her to be able to play with it, put her hands in her hair, shake her head around and tie it up. We started with ten hairstyles and then narrowed it down a little bit to six or seven. It was complex, but the nice thing about it was the [Willow] system could handle it and we didn't have to worry about it all the time. We figured it out early on and it was a nice change to focus on hair for our characters.

What were the scenes that you most enjoyed working on in the movie?

It's a tricky one because we have so many different characters. We have some quiet moments, these amazing shots in the car where these two characters are learning about each other and then there are some big emotional moments that happen at the end of the movie that I can't give away. There's some really powerful stuff in there.

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Technique focus

Incredible 3D artists take us behind their artwork

3D APPLICATION A progressive rock band from Toronto asked me to create this illustration for their album cover. They wrote an idea, and I decided to implement it because I liked it. I'm actually a 2D artist, but this time I wanted to play with 3D software. Some details from the piece are taken from photos. This work is a mix of different software.

Gediminas Pranckevicius
gedomenas.com
Lithuanian-born Gediminas works as freelance illustrator and concept artist.

Software Photoshop, Vue, SpeedTree, ZBrush, 3ds Max

Coffee Date, 2015

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EVERYTHING YOU NEED TO KNOW ABOUT 3D PRINTING

IN-DEPTH GROUP TEST • EXPERT DESIGN TIPS • TECHNOLOGY EXPLAINED

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Contributors from iMakr
Rees Calder, Kirby Downey

A few years ago, the advent of consumer 3D printing through initiatives such as Z Corp's Spectrum Z510, the RepRap project, and MakerBot's Cupcake CNC kit inspired many in the industry to predict a revolution in the way we live – and create – for good.

Today, the 3D printing revolution they were waiting for has truly begun. Local Motors has designed the Strati – the world's first fully driveable 3D printed car made up of 212 layers, while in China construction firm WinSun Decoration Design Engineering has 3D printed a five-story residential building in a matter of months. In the meantime, bioprinting company Organovo has even announced that its 3D printed liver tissue is now commercially available: an important first step towards producing whole human organs using 3D printing tech. In the world of consumer desktop 3D printers, things have also seriously changed. "Other than the constant improvements in speed and quality, I think the development of new materials is what I am most excited for," explains Rees Calder, marketing manager at the world's largest 3D printing store, iMakr. "Already we are seeing desktop 3D printers being able to print in wood, carbon fibre, elastic, copper and bronze composites, but I think filament manufacturers have only just scratched the surface."

With more desktop 3D printers, types of filament and extrusion technologies than ever before to choose from, we've teamed up with the experts at iMakr for a closer look at five of the best 3D printers available today to take your designs from the computer screen to the physical world.

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• IN-DEPTH GROUP TEST

THE PERFECT FIRST PRINTER
FLASHFORGE DREAMER DUAL EXTRUDER

$1,299 on the printer's official website, £999 at iMakr, and those who want to use it in the education sector can get it with an additional discount at iMakr for £499

If you've never owned a 3D printer before but have always wanted to try one, the Flashforge Dreamer Dual Extruder is an ideal way to start.

Coming fully assembled right out of the box, the Flashforge Dreamer is impressively easy to set up, even for beginners. It features a convenient LCD screen to keep users informed about the details of print jobs, along with support for everything from a 2GB SD card, included in the Dreamer box, to USB or Wi-Fi to upload the printing file with.

The Dreamer also has a lot of freedom for experimentation. It's able to print with both 1.75mm ABS or PLA plastic for a best resolution of 0.10mm, and can print using two different colours.

With a clean design, durable aluminium print bed, and an enclosed 230 by 150 by 150mm build volume chamber, the temperature levels are kept consistent to reduce warping as much as possible. Even the two spools of filament are stored internally, which means that less dust and other particles will

THE WORKHORSE
ULTIMAKER 2

€1,895 excluding tax from Ultimaker's website £1,819 including VAT at iMakr

This mid-level printer, designed for both non-expert and expert users alike, is one the professionals at iMakr very highly recommend. A workhorse of a printer, the Ultimaker 2 is very modifiable and excellent when it comes to high-precision prints, such as moving parts, due to its 0.02mm best resolution – that's an accuracy of 20 microns!

Like the Flashforge Dreamer, the Ultimaker 2 also comes with a built-in display on the front that enables users to communicate with the printer easily, along with a radial scroll wheel to adjust speed and heat even whilst it's printing. Connectivity is fairly simple with an SD card slot – the USB port is just for firmware updates.

Despite a price tag that may deter some potential buyers, the Ultimaker 2 looks well designed and reliable, with a heated glass print bed that can be removed for easy cleaning and a very generous 230 by 225 by 205mm build volume for its size. It can print with a wide variety of file formats including STL, OBJ, DAE and AMF; and once it is printing, the Ultimaker also features a fast print rate at 49dBA, and this makes the machine one of the quietest on the 3D printer market.

There's also a free open source Cura software package from the Ultimaker website. Designed with ease of use in mind, it's one of the most powerful ways to prepare for 3D printing in seconds.

TECH SPECS

Printing technology Fused filament fabrication
Best resolution 0.02mm
Build volume 230 by 225 by 205mm
Print material 2.85mm ABS or PLA
Printer software Cura
Weight 11kgs
Workstation compatibility Windows (7 and up), Ubuntu (12.04 and up), Mac OS X (10.7 and up)
Heated build plate temperature 50 degrees Celsius to 100 degrees Celsius
Extrusion (nozzle) temperature 180 degrees Celsius to 260 degrees Celsius

IN THE BOX

- Ultimaker 2
- 1 roll of filament
- Glue stick
- Power supply and cable
- USB cable
- User manual
- Glass plate
- Grease
- Hex wrenches
- SD card

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accumulate on the plastic and interfere with the final print quality. Of course, this means you may be restricted when it comes to spool size, as larger spools will not fit inside the printer. However, this can be easily corrected by simply feeding any bigger spools in from the outside, printing out your own spool holder from various online sources to help.

TECH SPECS

Printing technology Fused filament fabrication
Best resolution 0.10mm
Build volume 230 by 150 by 150mm
Print material 1.75mm ABS or PLA
Printer software FlashPrint, compatible with Skeinforge and Slic3r slicing
Weight 10.5kgs
Workstation compatibility Linux and Windows
Heated build plate temperature 120 degrees Celsius max (some cooling and warming in summer and winter)
Extrusion temperature 230 degrees Celsius max

IN THE BOX

- Flashforge Dreamer assembled 3D printer
- Power lead and power supply
- 2 spools of filament (one ABS and one PLA)
- 1 SD card

THE HIGH-TECH PRINTER
ZORTRAX M200

€1,595 from the Zortrax official website
£1,499 from the iMakr website

The latest printer from small Polish startup Zortrax sp z o.o., the Zortrax M200 has very quickly become a firm favourite amongst many 3D printing enthusiasts today.

Unlike machines such as the Ultimaker 2, the Zortrax doesn't make use of any open source solutions – instead working through dedicated software, firmware and even the company's own 1.75mm Z-Filaments. This makes using the M200 a little bit more restricted, particularly if you don't have easy access to Z-Filaments or don't feel comfortable using the Z-Suite software. Looking at the final results coming out of the printer, however, it's clear this pays off. Despite having an advanced resolution of 25-50 microns, the Zortrax M200's prints look like they are much higher in quality when compared to similar resolution products from other machines.

This all comes down to the printer's amazing technology. A system of dual x and y axes is used to lead the single extruder with high precision, and the quality of the printing greatly improves through the use of eight smooth rods. The M200 is fitted with an innovative autocalibration system that makes sure that the platform is levelled correctly every time and makes preparation minimal.

TECH SPECS

Printing technology Fused filament fabrication
Best resolution 25-50 microns
Build volume 200 by 200 by 185mm
Print material 1.75mm Z-Filaments
Printer software Z-Suite
Weight 13kgs
Workstation compatibility Mac OS X, Windows (XP, Vista, 7, 8)
Heated build plate temperature 110 degrees Celsius (230 degrees Fahrenheit)
Extrusion temperature 380 degrees Celsius (716 degrees Fahrenheit) max temperature

IN THE BOX

- Zortrax M200 3D printer
- One Z-ABS spool – pure white
- Set of accessories
- Z-Suite Software licence

THE BUSINESS TOOL
B9CREATOR V1.2

$5,243.40 assembled (non-US delivery)
$4,882.80 assembled (US delivery)
$3,985.20 Kit (non-US delivery)
$3,707.60 Kit (US delivery) – all from official site
£3,999 assembled from iMakr.com

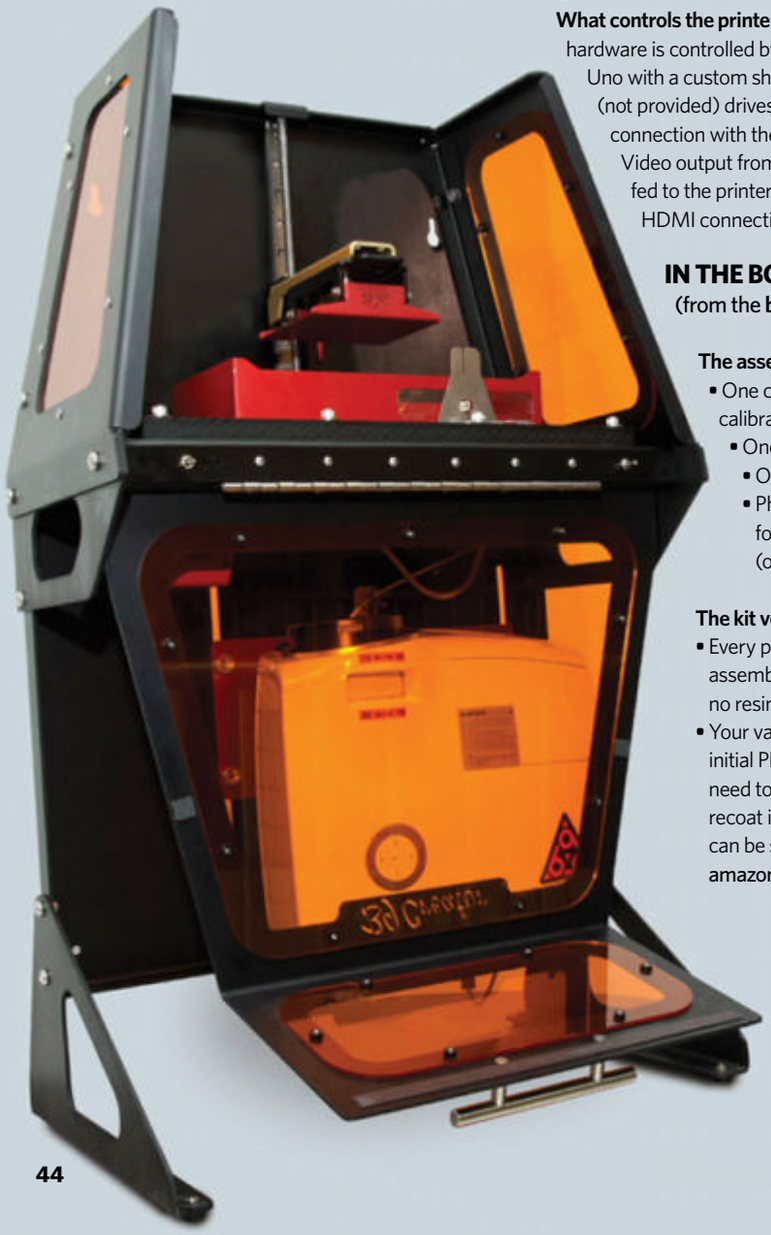
Don't let that price tag scare you away! Successfully funded on Kickstarter in 2012, the unique selling point of the B9Creator is the fact that it's not just for experienced hobbyists, but artisans too. In fact, it's now been widely used by makers and tinkerers, along with jewellery designers worldwide.

While every other printer we tested made use of plastic filament and FFF/FDM technology for depositing plastic models onto a build platform layer by layer, the B9Creator used a completely different technology to get prints done. The printer uses a powerful Digital Light Processing (DLP) projector to shine an image onto a layer of photopolymer (light initiated) resin. The entire layer is then cured to a solid, enabling a resolution as fine as 30 microns at much faster printing rates than FFF/FDM machines. The results are cheap, supercomplex tiny objects like never before – perfect for getting into the business of casting jewellery, for example.

Compatible with Mac, Windows, and Linux, the B9Creator is also fairly easy to use and assemble, featuring a USB connection to transfer STL files easily to the printer and a basic software suite that is free to download from **b9creator.com**.

TECH SPECS

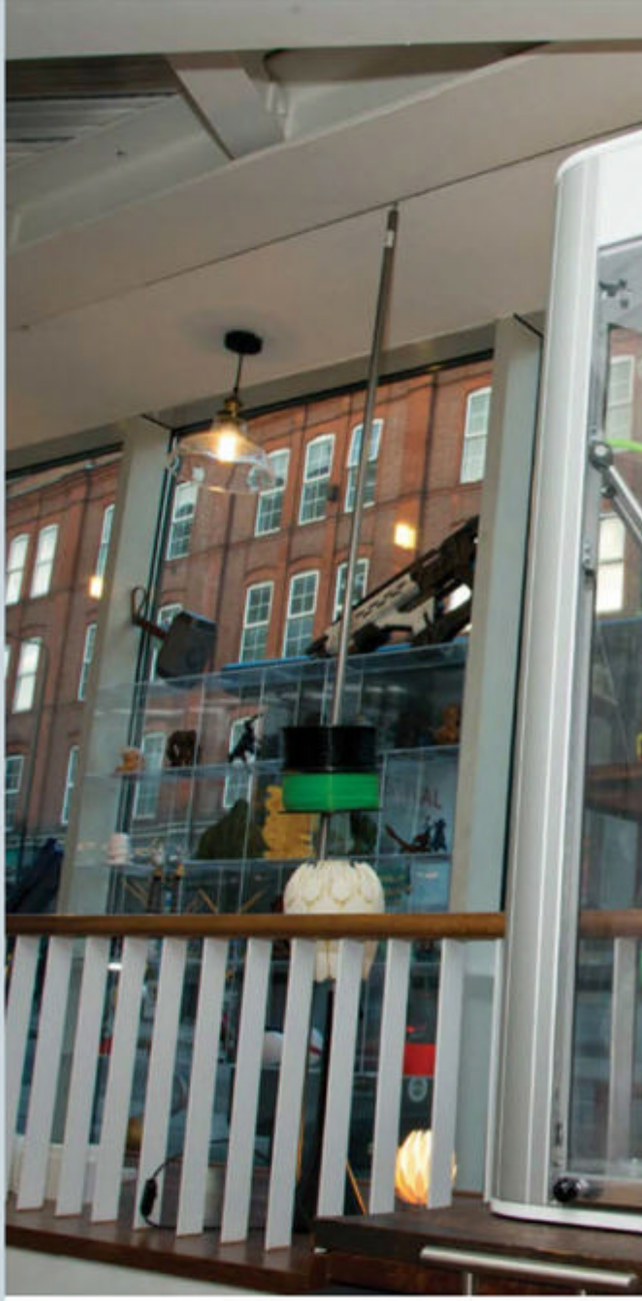
Printing technology DLP
Best resolution Up to 30 microns
Build volume x: 102.4mm, y: 76.8mm – build volume varies, depending on resolution
Print material Resin
Printer software Available as a free download from **b9creator.com**
Weight about 13.5kgs
Workstation compatibility Mac OS X, Windows, Linux
What controls the printer hardware The hardware is controlled by the included Arduino Uno with a custom shield. A host computer (not provided) drives the printer via a USB connection with the printer's Arduino. Video output from the host computer is fed to the printer's projector via VGA or HDMI connection



IN THE BOX
(from the **b9creator.com** site)

The assembled version
- One complete unit, ready to calibrate and print
- One litre of B9R-1-Red resin
- One extra precoated vat
- Phone support in English for your first print job, (one hour)

The kit version
- Every part you will need to assemble a working B9C – but no resin
- Your vat will be coated with an initial PDMS layer but you will need to acquire the material to recoat it (Sylgard 184), which can be sourced by visiting **amazon.com**



THE BIG PRINTER
DELTAWASP

€2,370 excluding tax on the official website
£2,249 including VAT at iMakr

Developed by Italian company Wasp, whose founder has also been working on creating a 3D printer capable of building a clay house for almost zero cost, is the DeltaWASP 20x40.

One of the defining features of the DeltaWASP is highlighted by the numbers in the printer's name: a huge cylindrical build volume with a 20cm diameter and 40cm height. This makes it great for big prints, enabling users to print large objects at home without worrying about dividing each model STL into separate parts that need to be glued or slotted together to fit after printing.

The DeltaWASP also gives an exciting amount of choice when it comes to printing materials as it's able to create using traditional PLA and ABS filaments as well as nylon, elastic polymers, polystyrene and Laywood – perfect to experiment on with bigger prints such as statues. The machine's body is well built and good-looking, made of aluminium and polycarbonate with a

glass plate that will enable heat to be kept inside the printer to avoid warping or shrinkage.

A recent firmware update has also added great features such as Resurrection, which 'saves' your print so that even if interrupted by something like a power cut, the machine is able to restart printing again exactly where it left off.

TECH SPECS

Printing technology Fused filament fabrication
Best resolution 50 micron, x y axis resolution 12 microns, z axis resolution 5 microns
Build volume 200mm diameters by 400mm high
Print material 1.75mm PLA, ABS, nylon, elastic polymers, polystyrene, Laywood
Printer software Any open source, Cura, Slic3r, Repetier-Host and so on, software settings are downloadable from the Wasp website
Weight 20kgs
Heated build plate 100W heated floor

IN THE BOX

- 3D printer assembled
- A glass bed
- Spool holder
- Power supply

EXPERT DESIGN TIPS

DESIGN FOR 3D PRINTING

Start printing today with these modelling tips from lead designer at iMakr, Kirby Downey

Don't allow overhangs Don't let your model have too many overhangs without anything under them. The idea is that anything on less than 45 degrees will require support. Anything more than 45 degrees doesn't need support.

Create great joints Get enough space for tolerancing if you are creating any moving parts. We get someone who works in SOLIDWORKS, who can actually make sure that an intolerance is created correctly, to create those joints. Next we test print the joints at a lower resolution to make sure they work fine, and then we actually put them into meshmixer and cleverly position all of those joints to the point where there'll be no support inside the cavity. So for example, if it's a ball socket we make sure that there won't be supports in the space between the ball and the socket. It will come out of the machine articulated, rotating already.

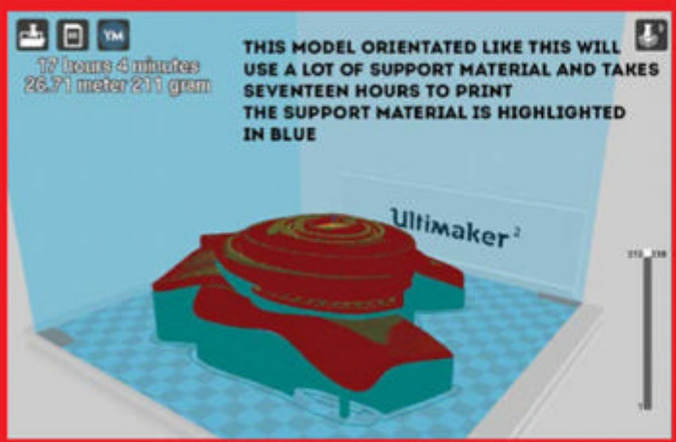
Don't concentrate too much on details Some printers simply can't achieve as much detail as you would hope for. So don't waste time and focus on creating every single crack and pore. Also remember that the more layers you have the longer it will take.

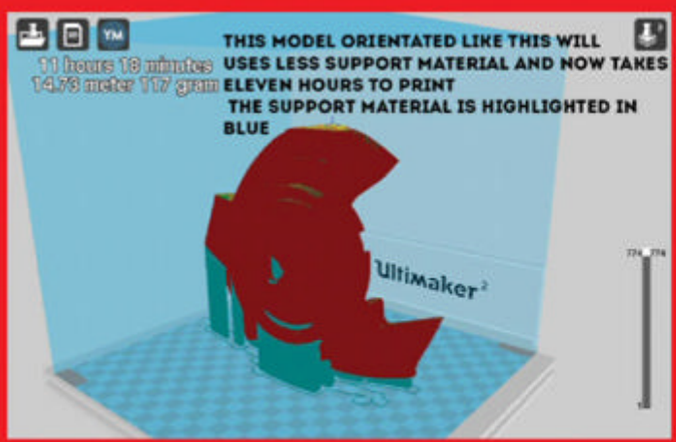
Avoid bulky areas If something is very bulky I would suggest hollowing it out on the inside so that you are using less material. The material is inexpensive, but you don't want to use a whole spool on one statue. No one will see the inside so it doesn't have to be detailed.

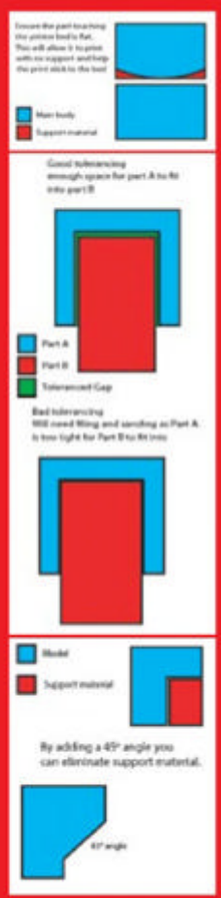
Keep your orientation in mind One of our designers printed a mask where it was orientated upside down and that took 20 hours, but if it was orientated with the front of the mask facing up it would take 16 hours – that was purely because of the support material that was needed. Each time you're adding support material it takes longer to print so you have to be smart about orientation.

Remember to make bottoms flat Make sure the bottom of your model is flat – it avoids warping.

Experiment! The only way to learn is by actually doing it. You don't even have to have a 3D printer to understand, just download software like Cura or MakerWare and you can simulate what the print is going to look like. You will also be able to see the difference between the model and the support, and you can see immediately where the support material is going to be.


17 hours 4 minutes
26.71 meter 211 gram
THIS MODEL ORIENTATED LIKE THIS WILL USE A LOT OF SUPPORT MATERIAL AND TAKES SEVENTEEN HOURS TO PRINT
THE SUPPORT MATERIAL IS HIGHLIGHTED IN BLUE
Ultimaker 2


11 hours 18 minutes
14.73 meter 117 gram
THIS MODEL ORIENTATED LIKE THIS WILL USES LESS SUPPORT MATERIAL AND NOW TAKES ELEVEN HOURS TO PRINT
THE SUPPORT MATERIAL IS HIGHLIGHTED IN BLUE
Ultimaker 2



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CHOOSING FILAMENTS

Discover the differences between the diverse range of filaments available

ABS or acrylonitrile butadiene styrene, is an oil-based, flexible material with a higher melting point than PLA, making it very suitable for parts that are exposed to high temperatures after printing. It's also dissolvable in acetone and lets users smooth out surfaces for a high-gloss look at the expense of some detail, or even glue 3D printed parts together. ABS can warp as it expands and shrink in the process of being heated and cooled down again. Using a heated build plate with it in an enclosed chamber is preferable.

PLA or polylactic acid, is a biodegradable polymer, which makes it more environmentally friendly than ABS. It's also dimensionally stable, meaning there is normally no need for a heated bed. PLA produces a naturally glossy, strong, nontoxic final material – though it's also more brittle, so may not be as useful for functional parts. PLA is often preferred for at-home 3D printing due to its low warping, sharper printed corners, lower layer heights, better smell and faster printing speeds.

SPECIALIST FILAMENTS

- **Glow in the Dark** is a filament that looks white in the day, and turns glow-in-the-dark at night. **Buy it** FormFutura EasyFil PLA Glow in the Dark
- **Colour Changing** is a filament that changes colour according to temperature. **Buy it** FormFutura Thermochrome EcoPLA
- **Wooden** combines plastic and real wood recycled wood fibres. It gives prints a wooden-finish or even smell. **Buy it** ColorFabb WoodFill, ColorFabb bambooFill, EasyWood Coconut
- **Metallic** is made up of metals, making it heavier with a metal smell. These prints need to be sanded and polished to shine. **Buy it** ColorFabb BronzeFill
- **Ceramic** is still experimental, but you could create results that can be fired to hard pottery with clay-based 3D filament. **Buy it** Lay-Ceramic
- **Carbon fiber** is made from PLA Resin compounded with 15 per cent by weight short chopped carbon fibers. It's designed to be stiff and resist bending. **Buy it** Proto-Pasta Carbon Fiber
- **Flexible Filament** is a special thermoplastic elastomer, producing flexible prints with elastic properties. Most 3D printers will need minor Flexible Filament modifications so that it extrudes well and doesn't buckle. **Buy it** NinjaFlex
- **Nylon** is a stronger, flexible and more durable alternative to PLA and ABS but has the tendency to warp. **Buy it** Taulman 3D Bridge Nylon, Nylon 618, Nylon 645
- **PVA** is a cold water soluble material that is extremely suitable for supports for complex ABS or PLA prints. **Buy it** Formfutura AcquaSolve PVA
- **Coming soon – conductive materials** iMakr's Rees Calder says that these will be a game changer and enables the addition of "circuit boards and other electronic components into our prints".

• TECHNOLOGY EXPLAINED

iMakr's Rees Calder talks us through the large amount of objects the team has been printing at its London store

RIGHT NinjaFlex is a flexible filament for prints that are able to bend, like the wings on this insect

BELOW A variety of filaments can now be used in 3D printers at home to give prints different colours or effects

THE 3D PRINTING PIPELINE

- Create your model using the software of your choice, from Maya, Rhino, SOLIDWORKS and ZBrush, to free tools such as Sculptris
- Remember that if possible, model with the advantages and restrictions of 3D printing in mind. This includes paying attention to minimising extruding parts to reduce supports, as well as thinking about orientation. Decimate your model to reduce polycount for printing
- Optional: export your model into Autodesk meshmixer, where you can experiment combining two different models into one. This can be useful for adding joints or sockets
- Export the model as an STL file and import it into your slicing software of choice or the printer's slicing software. The iMakr experts recommend Ultimaker's freely downloadable Cura, which can import either STL or OBJ files
- Experiment with the ideal settings and you're ready to print!
- The prints are measured in millimetre resolutions, with 'mm' representing the thickness of the layers of material each machine deposits to create the model
- Optional: share your file with others through iMakr's **MyMiniFactory.com**. Your object will be 3D test-printed and sent to you for free. If successful, you will be presented on the website to be downloaded and printed by others.

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man machine

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Technique focus

Incredible 3D artists take us behind their artwork

LIGHTING I plugged a solid colour into V-Ray's render environment GI and placed key lights in the bottom room, in the top and for the moonlight. For additional bounce, I used poly planes, positioned them and applied a subtle V-Ray light material. For a controlled amount of light, I used render layers and V-Ray's object properties to my advantage.

Jessi Ruselowski
jessiruselowski.com
3DArtistOnline username
WTF-Moose

Software Maya, MARI, ZBrush, V-Ray, Photoshop, NUKE

CU-02 in Love, 2014

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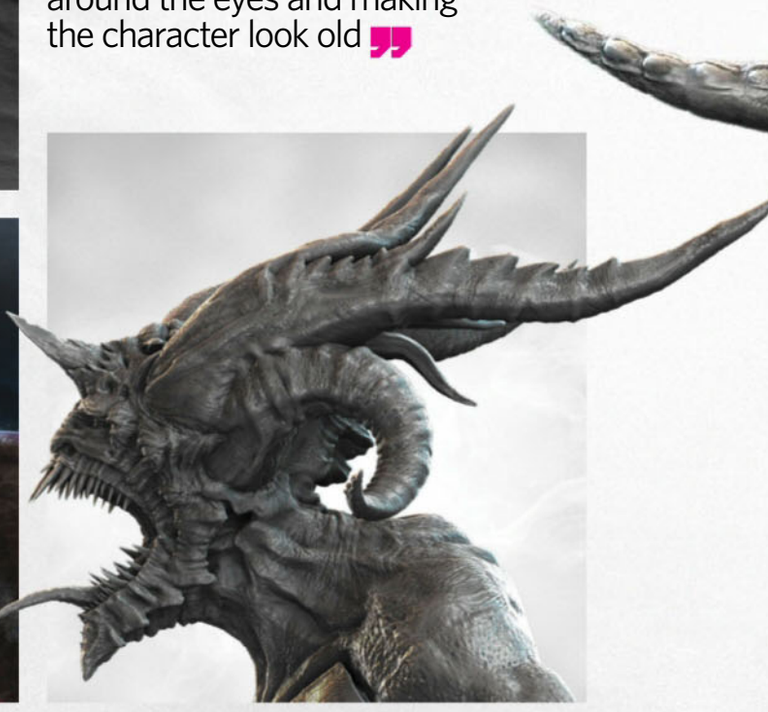
Create a primal bloodsucking vampire

Discover how to develop, pose and use render passes to make this master of vampires in ZBrush

In this tutorial we will create a posed and detailed character bust. Starting from just a 3D sphere, we will rough out the bust and then sculpt the organic forms and features. We will also make use of the readily available Insert Mesh feature to build the character. Later we will move on to editing these and then resculpting them so that they fit in to the design. After posing the bust we will use polypainting to create basic materials and textures for the model. Finally, we will take the 3D renders into Photoshop to finish the composition by adding lighting effects and textures.

Print your own *Master* bust using the file provided on filesilo.co.uk/3dartist

> Dam_Standard is great for enhancing the facial expression by drawing fine skin folds around the eyes and making the character look old

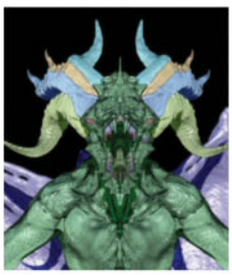


JAMES SURET
The Master, 2014

Software
ZBrush, Photoshop

Learn how to
- Create basic anatomy from just a 3D sphere
- Use Insert Mesh to quickly build your character
- Pose the character using masking and Transform tools
- Use DynaMesh to rebuild the topology of your mesh
- Use polypainting to paint materials and textures directly on to the model
- Create multiple render passes to create a high quality final image

Concept
The aim for this project for me is to create a detailed and expressive character bust in a horror style, and make the character as realistic as it can possibly be.



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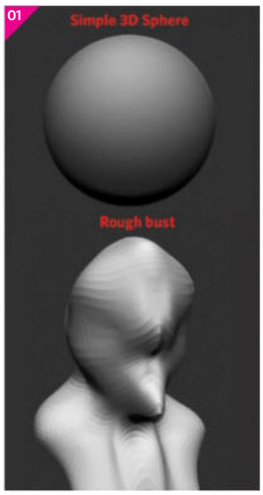
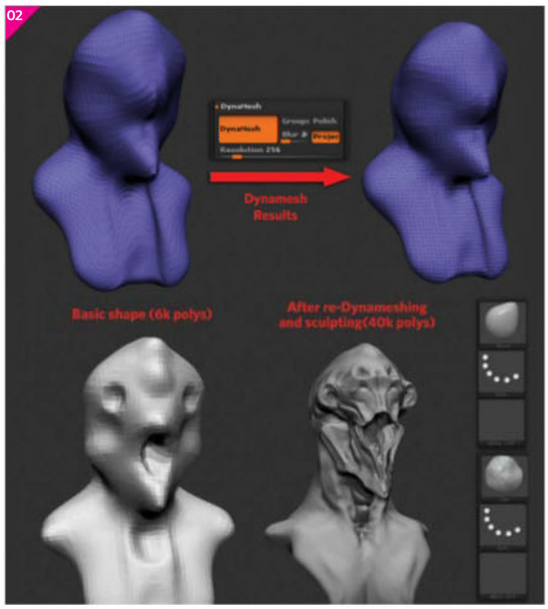
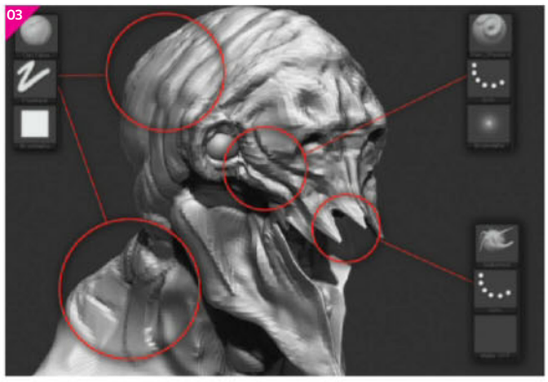
01 Create a rough bust First we insert a new 3D Sphere, press T to edit the object, click Make Polymesh3D and activate Symmetry by pressing X. Now with the Move brush set to a large brush size (by pressing the] key), we can push the shape around. The idea is to create the shape of a character bust loosely based on human anatomy. Initially, the important parts to work on include pulling out the nose and chin, and then pushing in the neck.

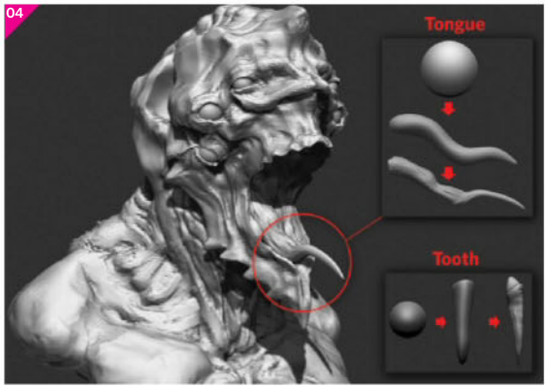


02 Develop the model using DynaMesh Now we have a rough form, but the mesh is becoming difficult to sculpt because of its topology. So use the DynaMesh feature with the resolution set to 256 – this creates a more even mesh to work with. We can then create more of the basic features. When we feel we need more polygons to add more detail, use DynaMesh again but with a larger resolution. At this point the poly count is quite high so start using the Clay brush to carve in smaller features such as the eye sockets, lips and muscles.

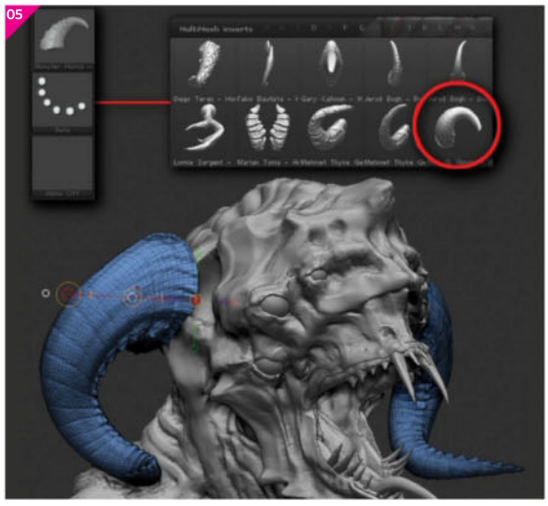


03 Sculpt the initial details The next step is to add character and realism to the model by sculpting basic skin folds and muscle structure. Using the ClayTubes brush we are able to quickly create the look of muscle fibre and bone. The Dam_Standard brush is great for carving lines and wrinkles. The SnakeHook brush is useful for quickly pulling out sharp shapes such as spikes and teeth. We are exploring ideas for this character's features and we may resculpt or replace them later. Next, we add the eyes by inserting a sphere. Mirror the sphere using the SubTool Master plugin, then move the eyes into place with the Transform tools.





04 Add facial features Mask out the lower jaw by holding the Cmd/Ctrl key and painting the mask on, then hold Cmd/Ctrl and click off the model to invert the selection. Using the Transpose tool, rotate the unmasked area by pressing R and move the end of the transpose line. To create the teeth insert a sphere. Pull out the shape of a tooth with the Move brush, use DynaMesh to even it and sharpen using the SnakeHook brush. Use the same process for the tongue and run the ClayTubes brush over the tongue for an organic look.



05 Design with Insert Mesh Now that one tooth is sculpted fill the mouth with teeth. Using the Move tool draw out a Transpose line, hold down Cmd/Ctrl and drag the centre circle out to duplicate the object. Then resize the tooth with the Transpose tool. Next, add horns to the character. Speed this up with a premade horn from the Monster Horns and Antlers brush pack available for free at **www.badking.com.au**. Click on the side of the character's head and drag out the desired horn size. Then use Transpose to position it.

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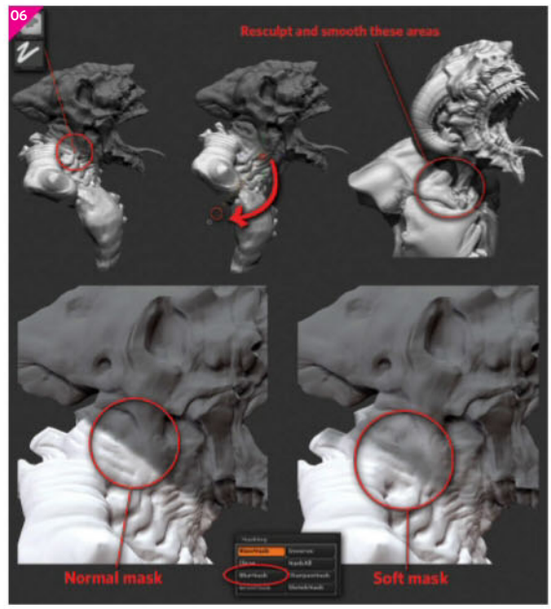
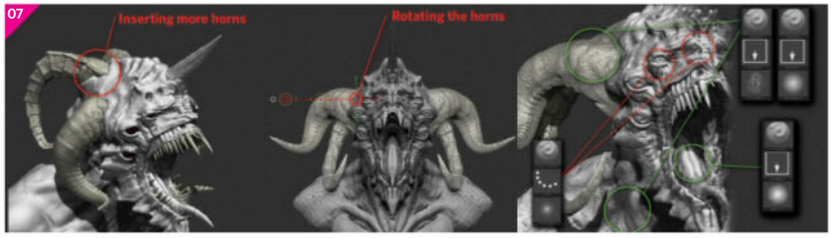
06 Pose the monster

Using the Masking tool, mask off everything from the middle of the neck downwards, then holding Cmd/Ctrl, click off the model to invert the selection. Using the Transpose tool now would create a distorted area around the edges of the mask. So to help solve this, hold Cmd/Ctrl and click a few times inside the masked area to soften the mask. Then when you rotate the area it will create a smoother bend. Either way we will need to resculpt these areas after posing, but this step will make all that much easier.



07 Change features and details

To develop the aggressive look, add another set of horns from the brush pack and rotate both sets of horns to almost intertwine. To balance the features, pull out the central horn and sharpen it using the Move brush. Use DynaMesh again at a higher resolution to sculpt more surface details. Now use Alpha materials with the Standard brush to stencil surface detail onto the model. ZBrush comes with some Alpha materials but there are also free ones at **pixologic.com/zbrush/downloadcenter**. With Alpha selected and Stroke set to DragRect we can quickly add surface details to the skin and horns.



08 Add the arms and wings

The arms are inserted from the human body parts Insert Mesh set that comes with ZBrush. Clicking on 'Split Unmasked Points' under the SubTool menu will create a new subtool. Use DynaMesh on the arms to smooth them out and increase the poly count. Now use Alpha materials to add skin details. The wing structure is inserted from the Dragon Insert Mesh set. Use the Inflate function under Deformations to flesh out the skeleton. Then insert a cube and resize its depth using the Transform tools. Now we can pull the cube out into a wing shape using the Move brush and even the surface with DynaMesh.

Alternative ways to start a character

We started this model with a simple sphere and shaped it into a rough human form. You can also use the human bust model DemoHead.ZTL that comes with ZBrush for sculpting directly, or you can insert a sphere, make it the same head size and activate Transparency mode. The latter method will let you rough out the shape of your model whilst being able to use the DemoHead bust underneath as an anatomical reference.

Showcase

James Suret

I am currently a full-time web developer and freelance 3D artist. I am constantly developing my portfolio with the aim of working as a concept artist in the games or entertainment industry. My main focus is creating original creatures and illustrations.

The Maw of the Sea **ZBrush, Photoshop (2014)**
The last stand against a giant monster. This piece was sculpted in ZBrush, and the paint and effects were done in Photoshop.

Victory **ZBrush, Photoshop (2014)**
A female cyborg displays her war banner on the battlefield. The cyborg was sculpted in ZBrush as a digital maquette.

Alien Cyborg **ZBrush, Photoshop (2013)**
A 3D character concept of an alien cyborg. This was sculpted in ZBrush with composition and effects done in Photoshop.

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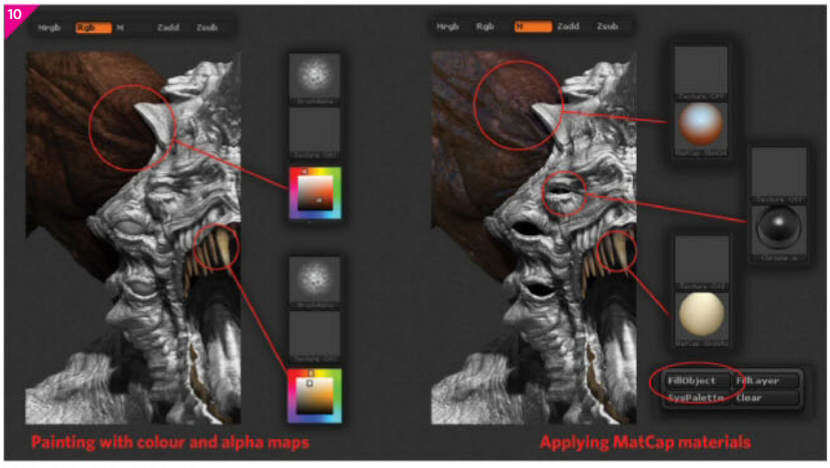
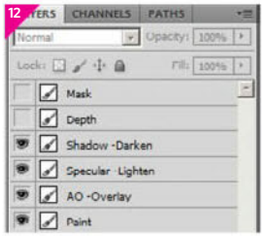
09 Final details Now we are happy with the overall design of the head but it looks too large. To remedy this add more horns and join them together. The idea is to give the character an ancient look. Now finish off the sculpt by adding surface details and small features. Use the SnakeHook brush to pull out spikes and bone shards on the top of the head. The Dam_Standard brush is great for enhancing the facial expression by drawing fine skin folds around the eyes and making the character look old. Then use several Alpha materials to layer hard and sharp textures onto the bones and soft bumpy textures onto the skin.

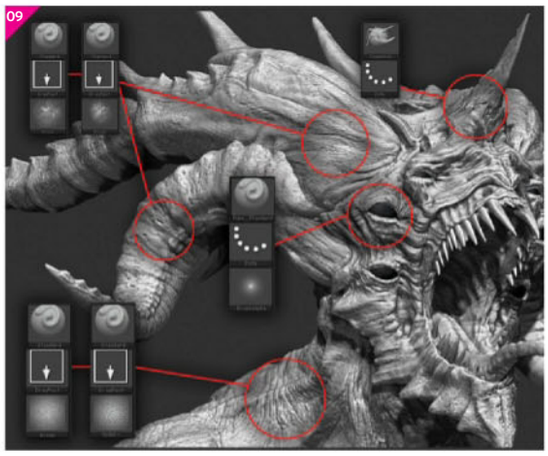


Kitbashing with Insert Mesh

Kitbashing is a method used to quickly add large features or fine detail to your models. ZBrush comes with a large collection of premade model parts. These can be inserted into your sculpture and duplicated and resized with Transpose. Once inserted, these objects can be resculpted just like the rest of your model. This lets you create a quick 3D concept of your character and later you can change the features to meet your design brief.

13 Add effects and textures It is a good idea to show a character concept in some kind of environment to help bring it to life. So add a background stock photo and apply a strong Gaussian blur to create a depth-of-field effect. Next, insert some stock photos of skin and bone to enhance the textures on the character; set them to Overlay and reduce the opacity. A great selection of free photo textures can be found at **cgtextures.com**. Finally, with the help of a soft brush we will add some soft lighting and glow effects to the teeth, eyes and bone. This emulates reflected light and adds to the atmosphere of the image.

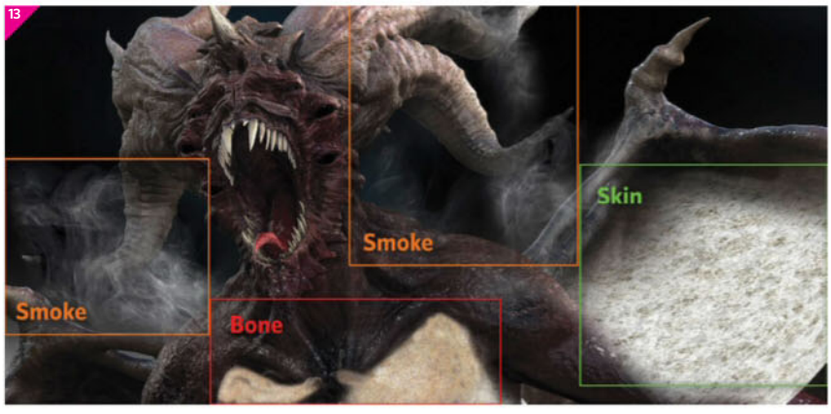




10 Polypaint the base textures Fill the model with a plain material by clicking Mrgb and selecting MatCap White01 as the material and FillObject in the Color menu. Make sure Zadd and Zsub aren't ticked (so we don't sculpt on the mesh), and tick RGB as this will enable us to just paint with colour. It's a good idea to choose an Alpha material to paint with so that we can blend colours naturally. Then apply some materials to enhance the textures. Make sure only M is ticked, select a material and click FillObject from the Color menu.

11 Lighting and rendering First we need to resize the document. For a landscape orientation we set the width to 3,500 pixels. Rotate the model to create an interesting composition bearing in mind the Rule of Thirds. Next, move the light placement by moving the dot around the sphere under the Light menu. Now set the shadow resolution to 8,000 on the BPR Shadow section of the Render menu to create higher quality shadows. Then enable Ambient Occlusion under 'Render properties' and set its resolution to 8,000. Click BPR render and save all of the render passes. Finally, fill the model with ToyPlastic material and black colour. Then click BPR render to create a specular layer.

12 Composite the layers in Photoshop After saving the renders as PSD files, open them in Photoshop and layer them up. First the main BPR render, followed by the AO layer set to Multiply – it helps add more depth to the render. Next, set the specular layer to Lighten, which brings out highlights along the skin. Finally, set the shadow layer to Darken to enhance the dark areas. The mask layer can be used to delete the background of the renders to enable us to place a background image behind the character.



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Animate a robot battle scene

Rig, light and render fighting robots fit for a movie

The development process of creating a finished artwork is important, so this tutorial will cover the main steps of conceiving an idea through to the final image. It will teach you to prepare the characters for a postapocalyptic scene in Maya, use a traditional rig and HumanIK rig to connect with motion capture files, create the materials with textures, create the light rig and use some V-Ray and Maya techniques. There will be different passes rendered including: Color, Specular, Reflection, Z-Depth, Render ID and Material ID. These elements will be assembled in Digital Fusion in the final composition to add some life to our characters. At the end we can play with different colour corrections to achieve the final look.

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"Attach the shoulders on separate bone chains as they are very big and need separate movement in the animation"

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ILIYA ATANASOV
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Software
ZBrush, Maya, V-Ray, Digital Fusion

Learn how to
- Prepare a 3D character mesh for work
- Rig a character with a traditional Maya HumanIK system
- Choose composition, pose and prepare the rest of the elements by modelling smaller background city elements
- Create some smoke effects by using the Phoenix plugin for Maya
- Prepare the lighting and rendering for the scene
- Composite separate passes

Concept
For the environment of this particular scene, I wanted to create a postapocalyptic world, so I found multiple references of ruined world cities. For the character fights I used references from games like *Tekken* and *Street Fighter*.

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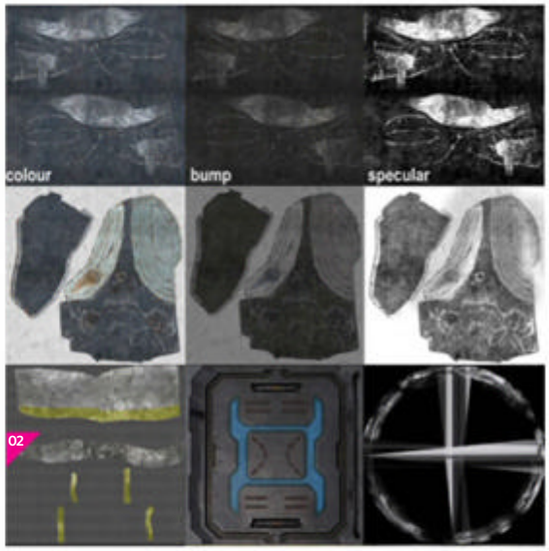
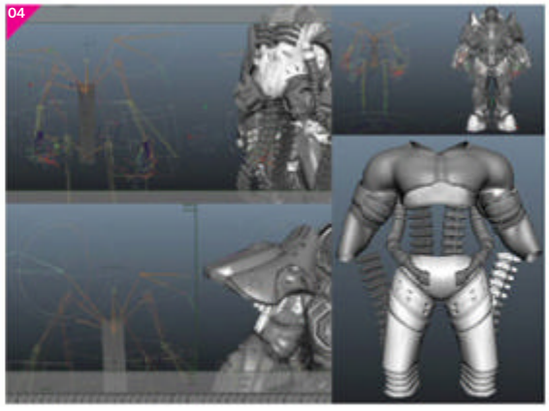
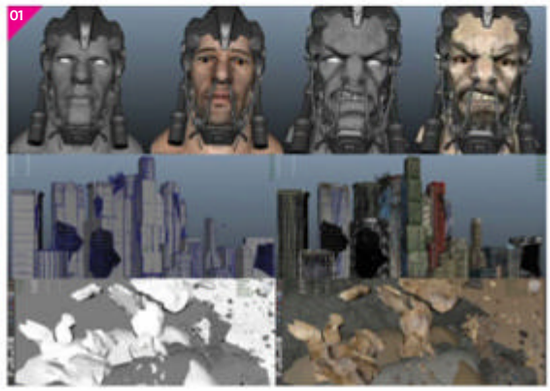
- Tutorial screenshots

01 Add the face and background elements In the movie our character has two faces and changes from good to bad. In most of the scenes the face is hidden, as the helm is very reflective. The same modelling techniques can be used from ZBrush to model the faces. There will be a transformation shot between them at the end of the movie, so model the good/human face first and distort it later to achieve the bad/monster one from it. In this case the same number of polygons will be maintained and the morph will be possible between them. For the background scene, create very low poly objects of buildings, broken poles, fences, roads, multiple rocks, bricks and so on. Use simple techniques of extruding faces from cubes to achieve the results. Use the Cut Faces tool to add more spans for the objects and the Bevel and Crease tool for creating smooth, sharp edges.







02 Texture the surfaces Every part needs to have unique UV coordinates so that it can be directly painted on top. Start with adding a fill colour texture, and after that create creases or scratches over the bended edges, following the UVs. Use different brushes to achieve different abrasive effects over the used metal. Desaturate the colours for an old-looking surface. Add dirt maps over the whole textures to create noise effect. Use different blend modes to add a couple of textures, one over another, for variety. For the colour maps, use Desaturate and Levels in Photoshop to create Bump, Reflection and Specular maps for the materials.

03 Smoke effects For the smoke use Phoenix software from Chaos Group. Create a fluid container, one source and a small sphere inside the container. On the container attributes, make Discharge 15 and Temperature 1,800 as you don't want fire in it. Run the simulation and save the cache. Reuse the same cached container for different locations inside the scene. Note that the simulation can be made in low resolution. Then use the resimulate option to add detail on top of the already cached simulation – this saves time when creating good-looking smoke effects. Don't forget to add wavelet output channels when simulating first pass. Then play with Time Scale inside Dynamics for slow motion effects.

Make the characters come alive!
The rigging and animation were made by Anton Gonzales and Rajesh RS. Use two different approaches for the character animation, a traditional hand-animated one and another driven by motion capture. First, create the initial rig for hand-made animation, you can parent or sync those controls later for the HumanIK rig.

04 Rig and skin Make a custom rig, which includes a typical bone chain for every limb IK handles for reverse kinematics for the hands and legs. The upper body is one big piece of metal, so there is no bending in the spine area. This brings some limitations on the animation movement of the character. As the character looks robotic, the skinning process is very easy. Parent the different mesh parts to their bones. Only a couple of soft, bend elements needs to be skinned. Use smooth skin and paint the vertexes or mesh if necessary. These elements are the bullet chains, the costume on the hands, the trousers and the two pipes from the sides of the waist. On his back the character has two big engines, so add additional bone chains to move the heads of the engine. Do the same with the shoulders and attach them on separate bone chains.

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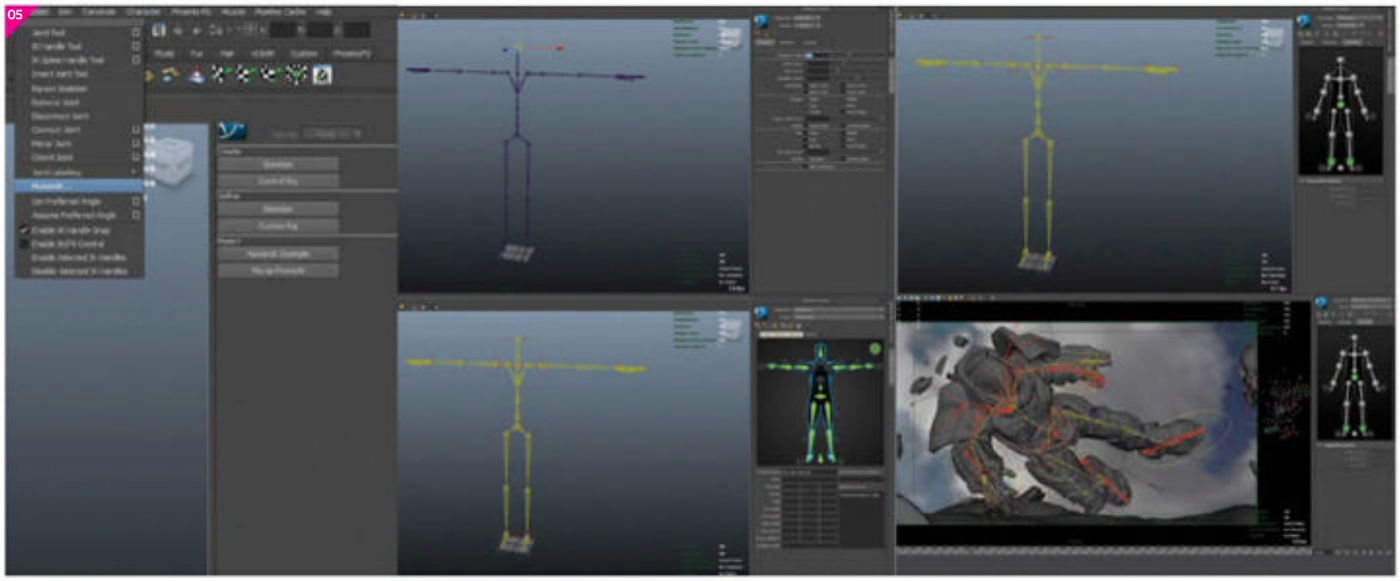
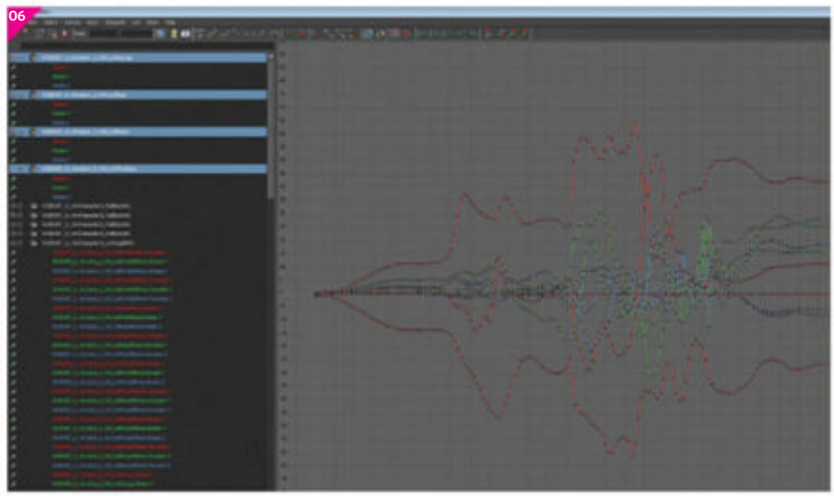


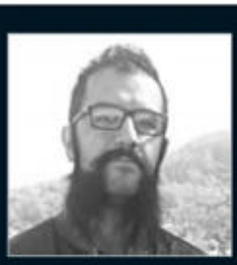
Materials, lighting and rendering

The V-Ray renderer for Maya is used here. The shiny metal parts of the character armour will have a lot of blurred reflections, which will be easy to render. The overall mood of the movie is ominous as we are in a postapocalyptic world so we will use smooth shadows. Separate the background from the foreground with two types of lighting. This will secure faster renderings of the different passes. An HDRI image for the background and three-point lighting for the characters will work best.

05 Animation with HumanIK Open HumanIK and then create a Skeleton. Then match the size of the new skeleton with the size of the robot character using Character Scale. After that, choose Control Rig from the Source Falling menu. This will place the control rig for this skeleton. Now parent the new control rig points with the controls of the robot character – this means a traditionally made rig is now connected to the HumanIK rig. Then import the motion capture animation files so that they are inside your scene. Now create a skeleton definition and define every bone from the motion capture file to the HumanIK. This can be done by clicking periodically from every green bone from the right to the appropriate one (bone or locator) on the left. Lastly source or retarget the robot character to the defined motion capture character.



06 Shot planing with motion capture For the shot, we will use two characters fighting. Duplicate the same robot one more time, and change the materials later slightly. Make a rough layout for the timing and the action. In the rendered image both of them needs to be in the shot. Once we are happy, move to the motion capture section and clean the animation curves. Open Graph Editor and use the Euler filter to secure the gimbal's rotations on the bones. This action prevents the jumping of the rotation axes. You can also use the Resample and Simplify curve options to avoid nondesirable jumps on the bones when rendering with motion blur later. This problem is not visible with a standard playblast or with the changes in every frame, but when you go to subframes, you will get an issue with the motion blur.



SIAMAK ROSHANI
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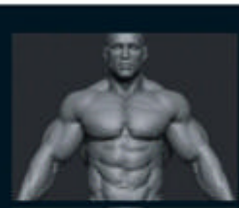
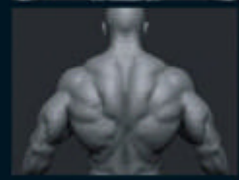
"I modelled and designed the character in Maya. Before modelling, I did some sketches in Photoshop. I used the Edge Extrude technique to model the character. Once I finished the model and UVs in Maya, I took it to ZBrush. For detailing in ZBrush I usually use surface noise and brushes such as ClayBuildup, Dam_Standard, Standard and Smooth Peaks. For texturing I used Photoshop and every part has its own texture (4k and 2k size). I used a very basic image for the texture base and 80 per cent of the textures were hand-painted in Photoshop. The character was done in 2010 (a personal project), and Pixelhunters asked to use it in their cinematic. The head model and texture inside the helmet were done by a different artist."

Showcase

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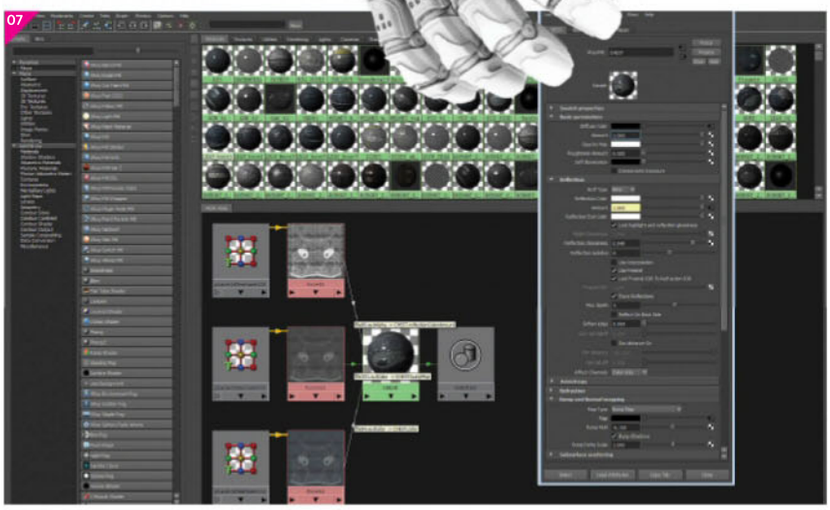

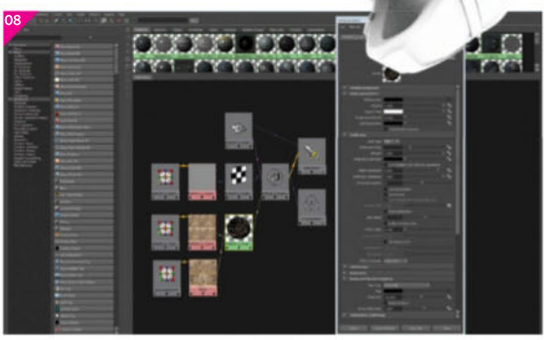

07 Texture the metal Now use a Standard V-Ray material. With the already prepared maps for Color, Specular, Reflection, Bump – connect them to the appropriate slots. For the very reflective parts like the chrome you can use Reflection Glossiness on 1 and control the Reflection Color amount for your own desired results. Some parts like the chest armour is not so reflective, so blur the reflections when you reduce the Glossiness factor. Do not forget that the number of subdivisions needs to be raised up, otherwise on the close-ups the noise will be too visible. Some materials like the side pipes and the engine need to have some highlight spots, so uncheck the 'Lock Highlight and reflection glossiness' option so that you can control the diameter of the highlights separately. On every shot the Bump multiplier must change and this will all depend on the distance from the camera. Use the same materials for the two characters and only desaturate their textures and change the glowing VrayLight material from red to blue for all of the incandescent parts.

08 Texture the ground and background Use the same type of V-Ray materials for the ground, rocks, buildings and so on. For the ground material let's use Displacement for extra details. Draw 32-bit EXR files either from ZBrush, Mudbox or Photoshop. Depending on the program and the way it exports change the Alpha gain and Alpha offset to 2.2 and -1.1, where 'Alpha is luminance' is checked. For the rocks and buildings that are further away, because of the destruction you can raise the Bump levels from 35 to 50 in the multiplier. To assure some secularity on the surfaces, lower the Highlight Glossiness to 0.855 and do not forget to turn off the Trace Reflection parameter.

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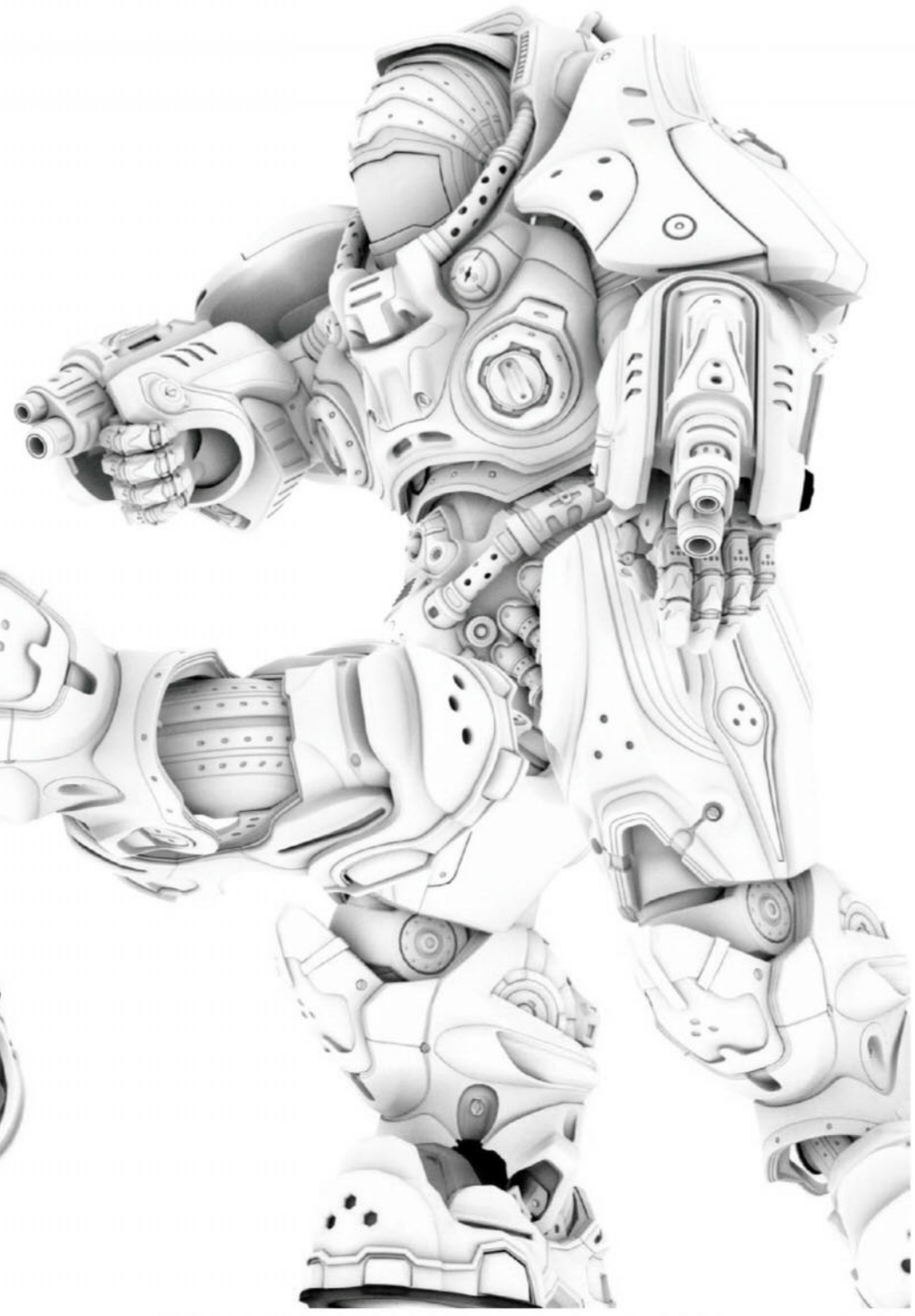
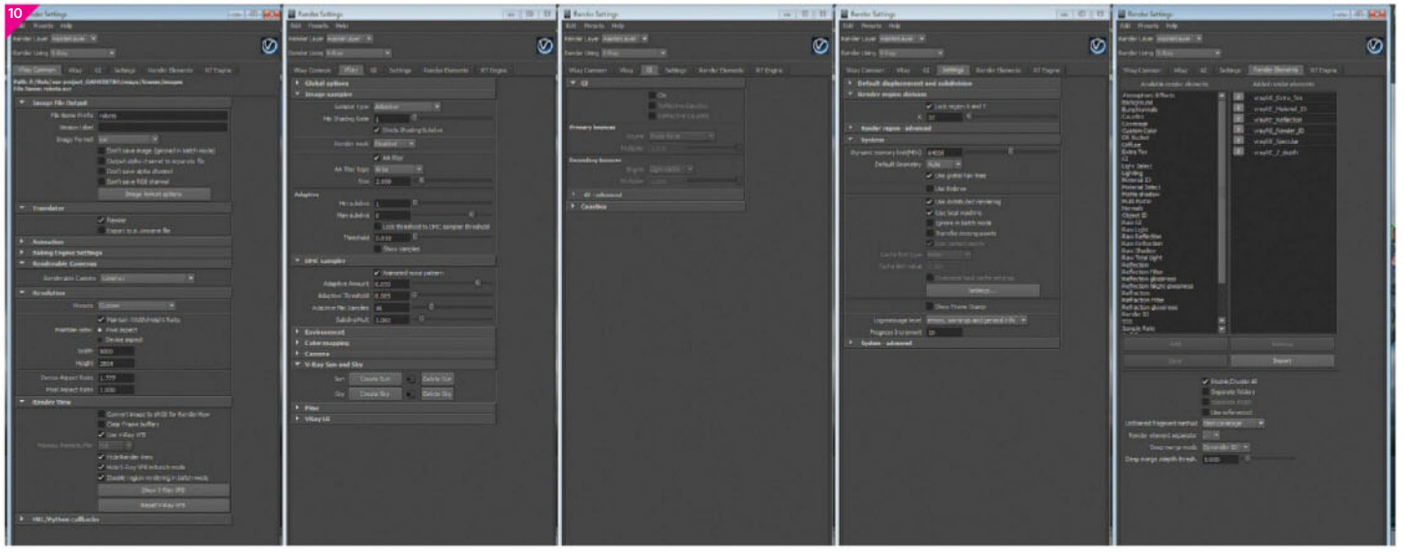


09 Lighting Create a VRayLightDome (only half dome), and attach it to some diffused sky image. This will be the main ambient light model and you can use it to light the background elements – the ground, poles, buildings and rocks. Add a couple of rectangular V-Ray lights to light the characters. The light colour needs to be slightly blue with an intensity of 20. Make all of them invisible, but visible in reflections. Two of them need to be lit from right to left, one needs to light the red character from below, as he is falling to the ground and will be too dark. A couple of spherical lights can be placed around some parts of the character's shoulders and around the waist area. For the red character make them red, for the other one – blue. Apply a strong intensity multiplier of 5 with a radius of 1. Keep in mind that all values are scale sensitive and that the reference for Maya is set in centimetres. Lastly you can add more detail in the shadows so add one directional light – a bluish colour with 1.1 intensity to light the scene from left to right.

10 Render Settings Open V-Ray Render Settings and choose the 32-bit EXR Image format. In the V-Ray tab raise the Max subdivs to 8 samples. Turn on DMC sampler to animate the noise pattern. The GI is not turned on here to save some long shot rendering time, and it suits the dark atmosphere too. Do not forget to work in a linear workflow with gamma 2.2. Try experimenting with the HSV Exponential type of the Color mapping section. Reduce the region divisions in the Settings tab if you intend to use multiple computers for rendering. Dynamic memory must be set up close to the RAM of your machine. Click on 'Use distributed rendering' if you have a render farm and enough licences. Now add render passes to be used in compositing. This image was rendered in 35 minutes with one computer using dual Xeon processors at 2.9GHz.



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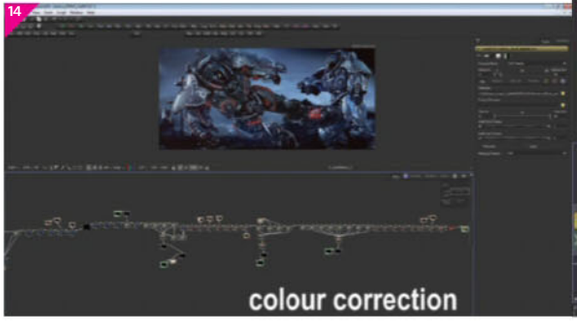
11 Use the essential passes There are a couple of important passes for assembling the composition. For the characters these are Beauty, Reflection, Specular, VRayDirt (Ambient Occlusion) pass, Z-Depth, Render ID and Material ID. The Material ID pass is the VRayLight material of the small glowing tubes flowing through his body. Use this pass to make these tube parts stronger with a small halo around it. Render ID is a pass which can stay as a backup, if you need some extra masks later on you can always chroma key it from this pass and use it in the composition. In general it attaches unique Material ID to every object in the scene and there is no need for any initial setup of the pass, just keep in mind that additional edge blur filters might be needed.

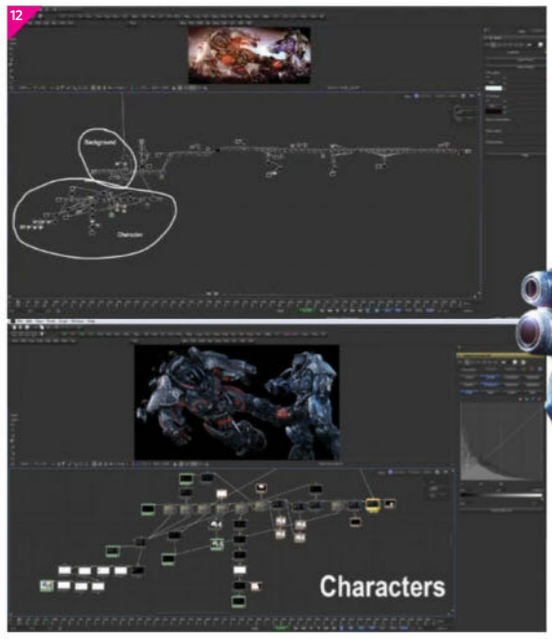
12 Composition of the characters One chain will be for the characters, another for the background. Start with the characters on top of the Beauty pass then add the Reflection pass onto the screen with a 0.6 blend. Then on Screen mode add the Specular pass. On Multiply mode add an AO pass with 0.8 value. For this render, only one material is used for both characters, so in the composition add a colour corrector on the Material ID pass with a polygon mask to separate them from one another. Add a soft glow and a normal glow on top and 'screen' it again over the other passes. Use Luma Keyer to extract highlights from the Specular and Diffuse pass to add on top of the shiny armour. As the overall lighting is set up to be very blue, the composition will look bluish here.

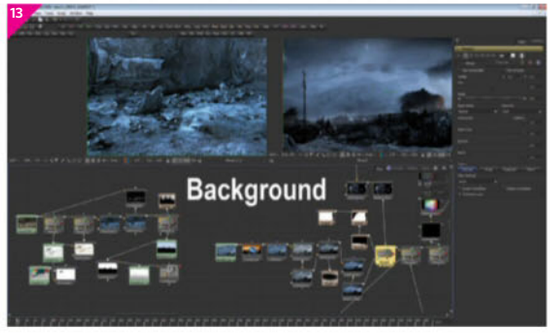
13 Composition of the background Apply a very similar process here as well. Another approach for the long shots is to render one frame of the background and composite it – in the same way as the characters – and after that just use the camera movement to render the offset position of the background plane. Of course there will be no parallax or perspective change when the camera moves, but for far away and blur backgrounds this will work. The render is then projected onto the plane and placed behind the characters, using the same movement from the 3D camera.

Compositing

This is the process needed to make the picture more beautiful via assembling all render parts. In this case, there is a separate background layer, foreground layer for the two characters, additional broken metal parts from the red character and multiple passes of dust and particles from the atmosphere. Use float 32-bit mode for the whole process with colour corrections and blending, and then save as an 8-bit single file. Some extra plugins may be handy like Sapphires and REvision Effects.







14 Finalise the colour correction Add a couple of defocus filters, lens flares, and some vignetting on the edges of the picture to achieve more of a film-look to it. Filters like distort RGB will put some extra RGB offset of the channels around the edges of the objects. Use the unsharp mask filter to exaggerate some elements of the characters like the hands and the head. Finally for this part of the movie the characters are in a kind of memory or dream, so the colour grading needs to be different from the original blue theme that we talked about earlier on in the tutorial. For that purpose add a couple of colour correctors and tint filters to offset the gamma into a more orange or red-ish tone. Work separately for all of the shadows, midtones and highlights. Now you can apply levels to crush the highlights and dark tones a little bit more, and this will secure a stronger contrast.

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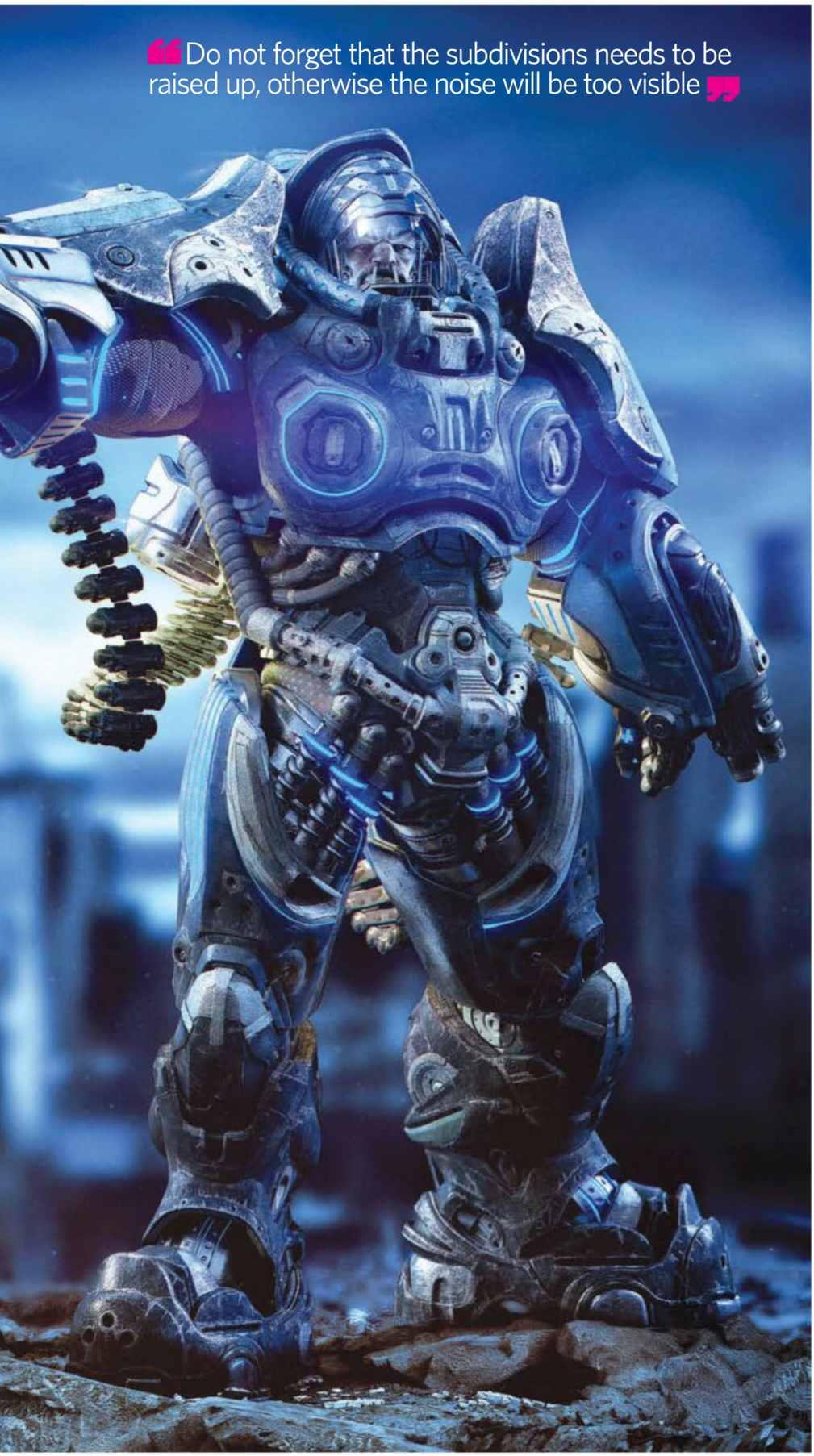

Showcase

Iliya Atanasov

I am a 37-year-old Bulgarian CG artist. My experience includes working for TV channels, advertisement agencies, film companies and game studios. I am the co-founder and studio director of Pixelhunters, which is based in Dubai, United Arab Emirates. I mainly focus my work on games and game cinematics.

Coliseum scene **Maya, Digital Fusion (2014)**
All of this was modelled in Maya, with some Despona models for the sculptures and columns. This was rendered with V-Ray.

Malaysia Dream **Maya, Vue Infinite, Digital Fusion (2012)**
Maya was used for the foreground and water simulations, Vue for the mountain environment and V-Ray for the rendering.

Water Huts **Maya, Digital Fusion (2011)**
Fast modelling for the houses, Maya was used for the paint effects and Xfrog for the trees. All rendered with mental ray.

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Our experts

The best artists from around the world reveal specific CG techniques

NUKE

Paul Champion
linkedin.com/in/pchampion

Paul is a 3D and VFX BA, MA and MSc course demonstrator at Bournemouth University's NCCA

Maya, Octane

Eric Keller
bloopatone.com

Eric specialises in scientific visualisation and teaches at the Gnomon School of Visual Effects

Corona

Peter Ang
dartofang.com

Peter has been doing 3D visualisations since 2008. His work has been featured in print and in art books

Maya, Mudbox, Photoshop

Jochem Aarts
jochemaarts.com

As winner of the Exposé Master Award 2013, Jochem creates high-end visuals for a variety of platforms

LightWave, ZBrush

Lorenzo Zitta
zittart.com

Italian-based digital artist Lorenzo is an expert in CGI and retouching. He has won several awards

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NUKE

Master multiplanar compositing

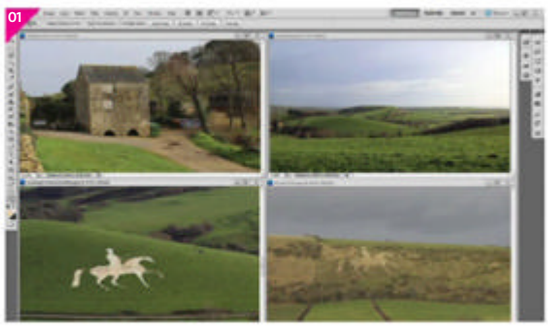
The concept of camera projection (also known as camera mapping) has been used for a long time in the movie industry. It's a technique that has its roots back in predigital days before the advent of CG, pioneered by film-makers such VFX titan Ray Harryhausen. At its most basic level, it's similar in essence to what you see in a cinema, where a movie or image is projected onto a screen. Nowadays, we thankfully have advanced tools such as NUKE to make what must have been arduous tasks a lot easier.

Camera projection is a powerful and useful technique that doesn't need to result in hefty render times or complex modelling. It's frequently used to trick viewers into thinking that a 2D flat image is in fact 3D, as there's also scope for limited camera movement and changes of perspective, which we will look at in this tutorial.

The pipeline that we will use is Photoshop>Maya>NUKE to create a rendered camera projection with a camera move shot, from a matte painting. You can of course use other 2D and 3D applications if you don't have access to those. We will focus on NUKE for the most part anyway but the first couple of steps will give a quick overview of a workflow that you may wish to use – to create your own matte painting and geometry, and also what you'll need to export to NUKE. You can of course skip the first couple of steps and dive straight into NUKE using the provided assets.

As well as projecting a matte painting onto simple geometry, other common uses for camera projection in NUKE are relighting a projected plate and creating a clean plate by projecting a repainted plate. Projections can also be joined together for more complicated shots.

01 Matte painting with Photoshop There are three photographs provided, from which we will create two images. If you are using your own images, you'll need to remove any lens distortion via Photoshop's Lens Correction Filter, by selecting the camera and lens you used. Open Landscape.jpg and use the Clone brush to remove unwanted elements. Cut out and copy/paste the horse onto the hillside, use Auto Tone and Levels to make it a chalky white, and save. Finally copy/paste the building, offset the building to the left, and use the Eraser and Clone brush to remove any more unwanted elements.



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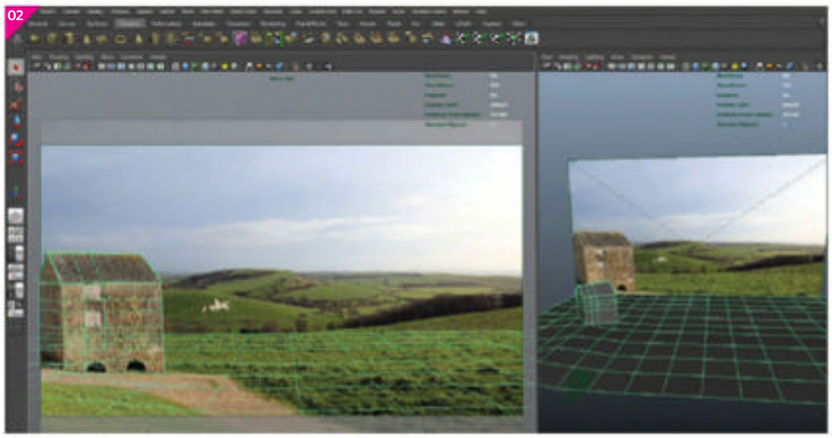

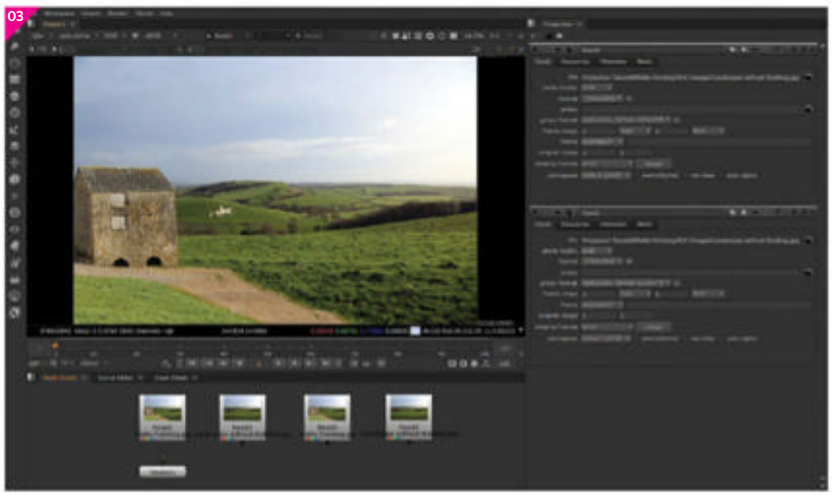

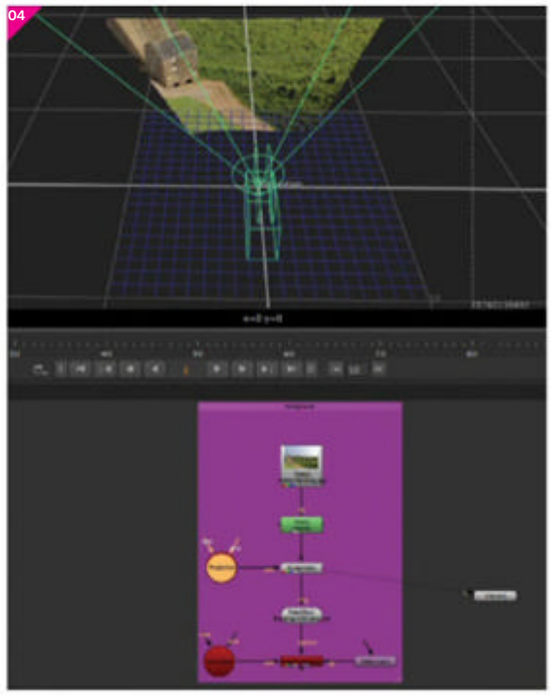

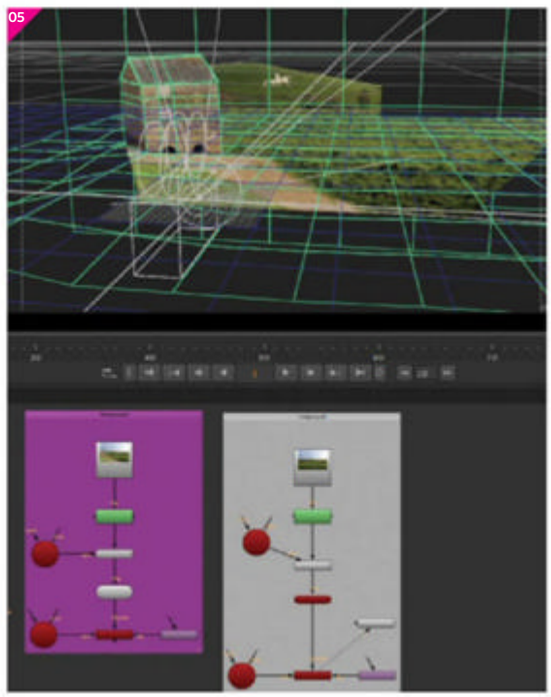

02 Create geometry in Maya In Maya, select Create>Cameras>Camera, then Panels>Look Through Selected. Next, go to View>Image Plane>Import Image and browse to Matte Painting.jpg. Finally go to View>Camera Settings>Resolution Gate. Adjust your panel layout to see through the persp camera and camera1. Create a Polygon Cube and use the persp camera rotate and scale to roughly match the building without the roof. Now, extrude to add the roof. Use the modelling toolset to make a low-poly model of the building, save, then make a model of the building and foreground terrain. Export the camera as FBX and meshes as OBJ.

03 Import and set up in NUKE In NUKE, begin by importing the matte paintings, one with the building and one without it. With the mouse over the Node Graph press the Tab key, type Read and press Enter. You'll use this method when any new Nodes are created. In Read Node, browse to Matte Painting.jpg and hit Open. Repeat this for Landscape without Building.jpg. Select Read Nodes and copy and paste it to make a duplicate. Go to Edit>Project Settings and in Root set the full size format to 5,760 by 3,840, which is the size of the photos.

04 Project the foreground Select a Matte Painting.jpg (Read1) and add a Roto. Then roto around the building and foreground with the Bezier tool. Turn off Auto Key, delete the keyframe and set Premultiply to rgba. Add a Camera and in its file tab browse to the camera.fbx exported from Maya. Connect the Camera and Roto to a Project3D. Then add a ReadGeo and select the Building with land.obj. Add a Scanline Render, then add another Camera and connect it. Also add a Reformat and set to root.format. Rename the first camera you created to 'projector', and the second camera to 'animated'.

05 Project the midground We will use a similar workflow and nodal tree as we did in Step 4 for the midground. The differences are that this time we start with Landscape without Building.jpg (Read2). Add a Roto now and then draw around the hillside with the horse. Instead of a ReadGeo node, add a Card. In the Card tab make sure that you increase the uniform scale to 100, and then move it back in the z axis to around -80. You can view your progress in the 3D environment by pressing Tab while the cursor is in the Viewer. You can fine-tune its position once the background is created.

Projecting additional patches

Depending on your camera move, you may find that the 3D illusion is broken when your animated camera frames an area where there isn't anything projected. A solution to fix this requires you to have geometry to project onto and a patch image. You can then project the patch with a second camera to cover up any empty areas. To join the patch to the network, use a MergeMat node, and connect it to the network after the Project3D nodes and set its output to the geometry. Then move the projection camera so that it projects onto the problem area.

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06 Project the background Now load the remaining Landscape without Building.jpg into Read4. For the Card, set uniform scale to 100, rotate -45 in x, then move it to -86 in the z axis so the bottom of the hill aligns with in the midground Card. To increase parallax: in the background Card, go to Deform tab, set type to bilinear and increase x/y points to 8. Switch to side view, then marquee select and move groups of points to reshape the Card and increase the sky's falloff.

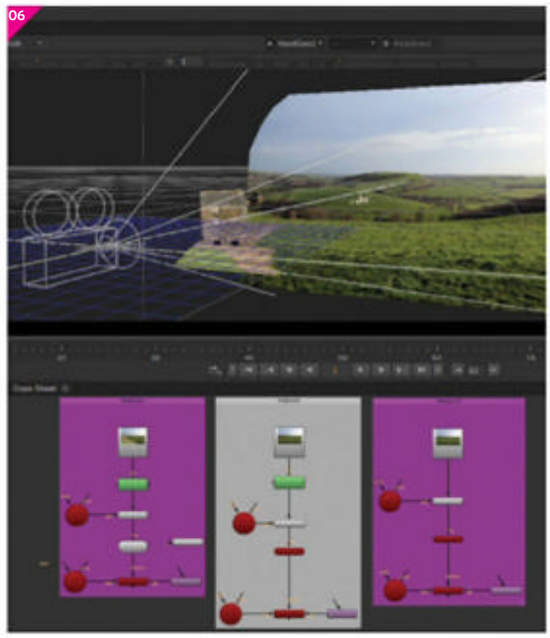
07 Composite and camera moves Add a Merge Node that is set to Over, connect A to the midground scanline render and B to the background scanline render. Add another Merge set to Over, connect A to the foreground scanline render and B to the first Merge. Delete the cameras connected to the midground and background scanline renders (not the projection cameras), and connect the camera connected to the foreground scanline render to all three. Add a Viewer and adjust the UI to see through the animated camera, and view the animated camera. Now keyframe the animated camera to frame your shot.

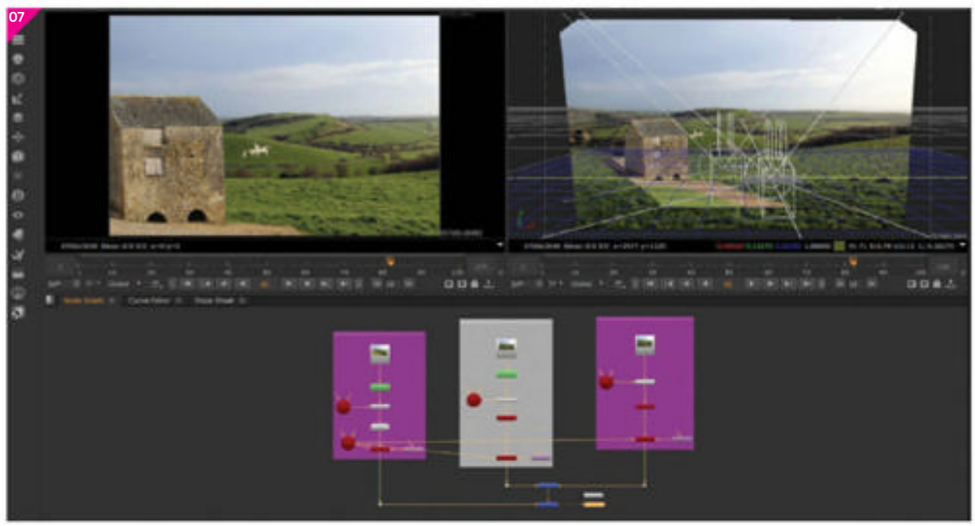
08 Blend the edges Add a Transform between the Merge Nodes and set its y value to -150 to move the midground and background down. Add an Edge Detect to midground scanline render and set channels to Alpha. Add a Blur above the Transform and connect its mask to the Edge Detect. Then set the Blur's size to 3. Copy/paste the foreground network, and change the ReadGeo to Building.obj. Add an Edge detect set to Alpha to both scanline renders. Connect them with a Merge set to Plus, add a Clamp and mask to a Blur that is set to 3. Connect the second Merge Over to the Blur.

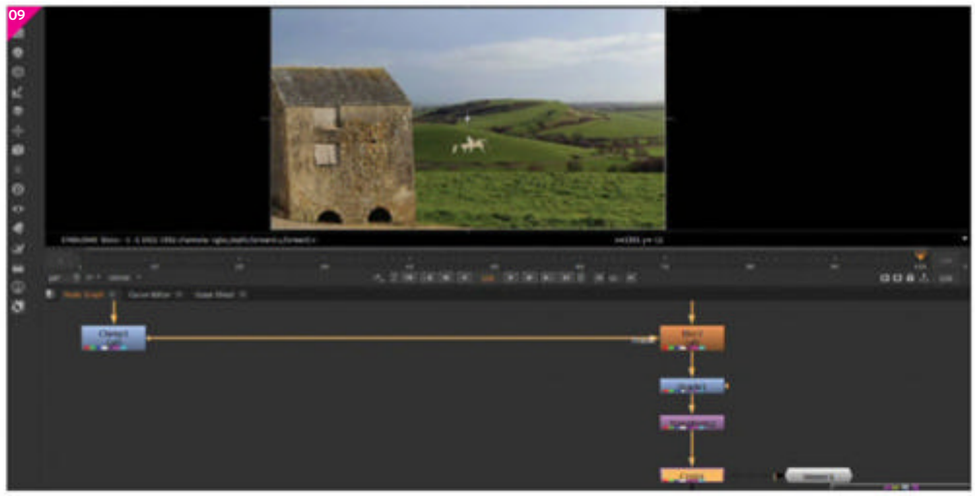
09 Final grading and output Connect a Grade to the Blur at the end of the network and do a final grade. Once you're happy with the overall look, connect a Transform and then a Crop. Change the Crop box r to 1,920 and t to 1,080 for our shot's resolution size. In Transform, set scale to 0.34 and use the transform handle to position footage inside the crop window. Enable reformat in crop settings. Add a Write node to the end of your network, and then you can choose your render settings.

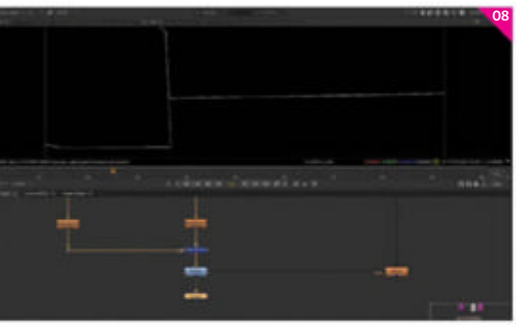
Add a sky replacement

Sky replacements in this kind of shot can be difficult and time-consuming to set up. If the replacement is very different to the original then you'll find that it will mismatch with the rest of the shot. If you have a hazy sky, you will need to use the Depth channel to add that to the rest of shot. Other challenges could be obtaining a good alpha of the horizon in the background to remove unwanted sky.









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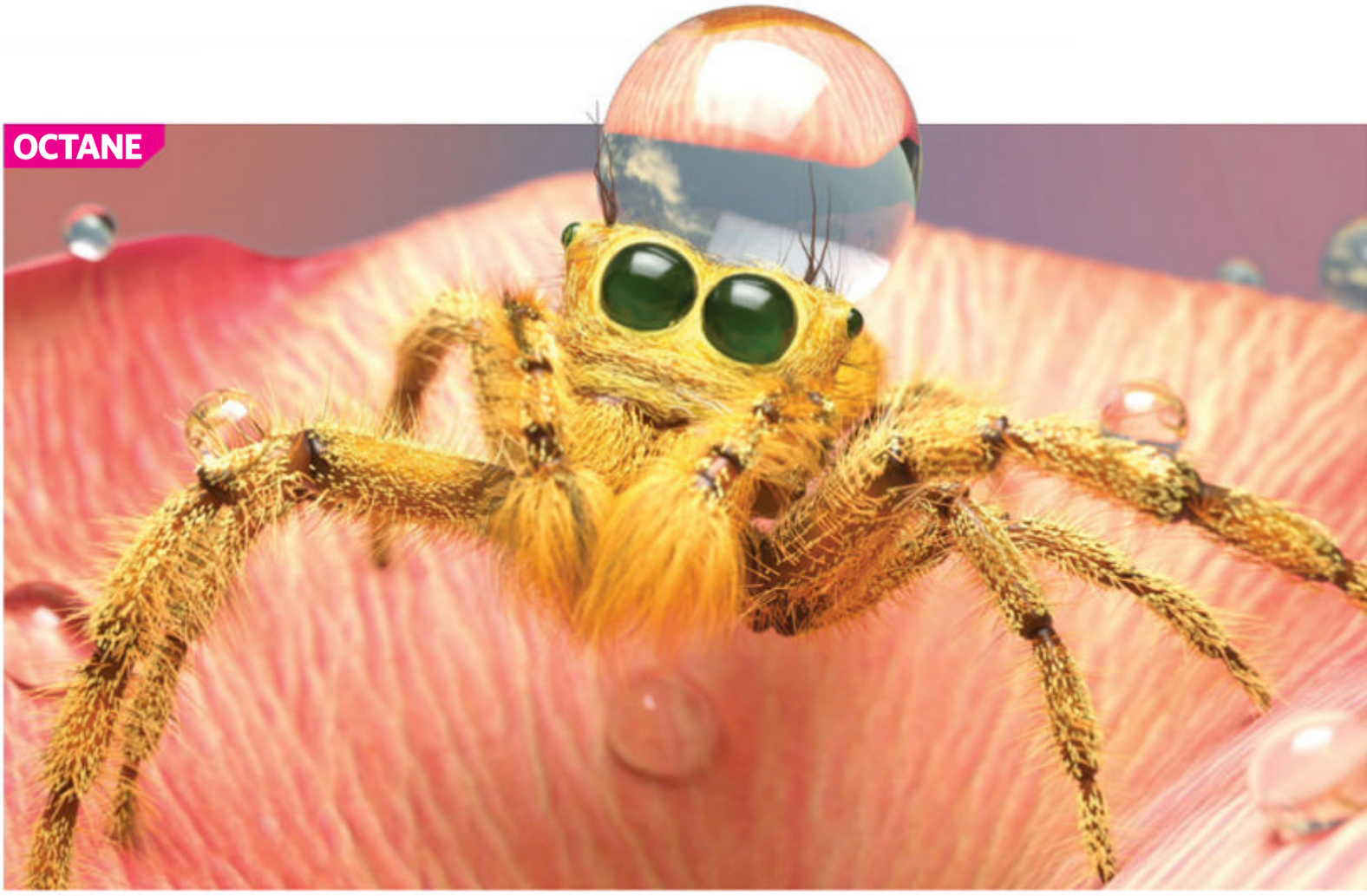

Simulate macro photography

Creating a truly realistic macro photography render requires a physically based renderer, some knowledge of basic photography, and patience. Octane is a GPU-based renderer that is gaining popularity because of how it balances ease of use, speed, and overall rendering power. Octane is a stand-alone rendering application that also offers additional plugins for all of the most popular 3D apps.

This tutorial goes through some techniques developed using Octane for Maya to create the macro photography renders. To use Octane you must purchase the stand-alone version and then also purchase the plugin. The stand-alone application is an easy-to-use node-based system with a GUI that is reminiscent of a compositing program such as NUKE. This tutorial focuses on the Maya plugin which integrates perfectly and feels more stable than Maya's own mental ray renderer! Both the stand-alone version and the plugin are very affordable, a joy to use, and produce results that can be superior to mental ray and V-Ray. The rendered images you see in this tutorial had little to no postprocessing in Photoshop beyond slight colour and exposure adjustments. The main advantage of using the Maya plugin versus the Octane stand-alone is that animations can be rendered without the need to export an FBX sequence to the stand-alone version of Octane. Octane requires a CUDA-enabled graphics card. For this tutorial we are using a PC running Windows 8.1 Pro, Maya 2015, with 64GBs of RAM and two Nvidia GeForce GTX 780 Ti graphics cards.

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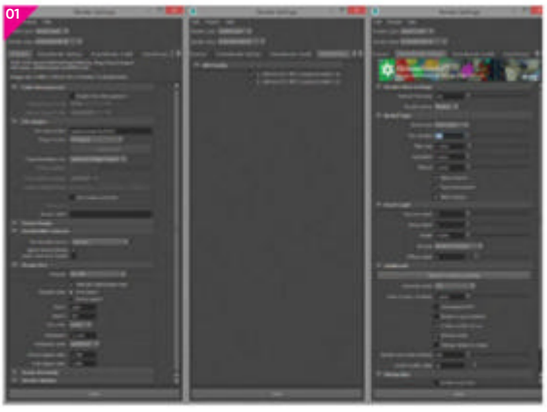
01 Configure your render settings This tutorial assumes that you have both Octane and the Octane Plugin for Maya installed and activated. Let's start with loading your scene. In the Common Tab, Maya's Render Settings window, set Render Using to OctaneRender. Choose your rendering camera and resolution – the HD 720 Preset works for this example. Switch to the Cuda Devices tab and activate your CUDA-enabled graphics card(s). In the OctaneRender Settings tab set the Kernel type to Direct Light and Max samples to 200. This is a low-quality preview setting which will keep interaction fast while you set up the scene. You'll change these options for the final render later.



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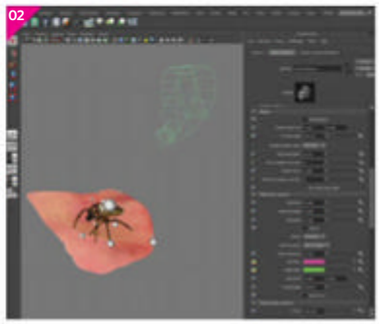
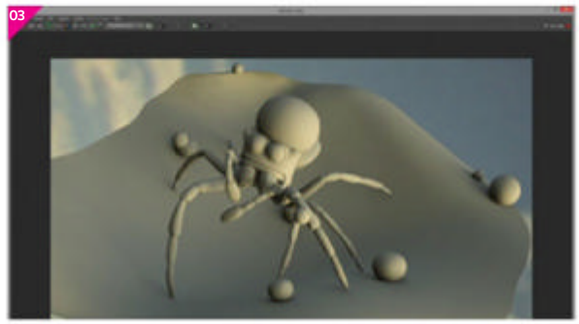
02 Set up a camera Choose the OctaneRender tab on the Maya shelf and click on the camera icon to add an Octane camera – this is just a Maya camera with additional Octane settings. Many of these settings override standard camera options when rendering in Octane. Position your camera to look at your subject. In this example, we're using an adorable jumping spider model created in ZBrush, perched on a flower petal. Select the camera and open the Attribute Editor. Set the Octane Camera type to Thin lens and set the Aperture to 0 so that the image is entirely in focus while you work.

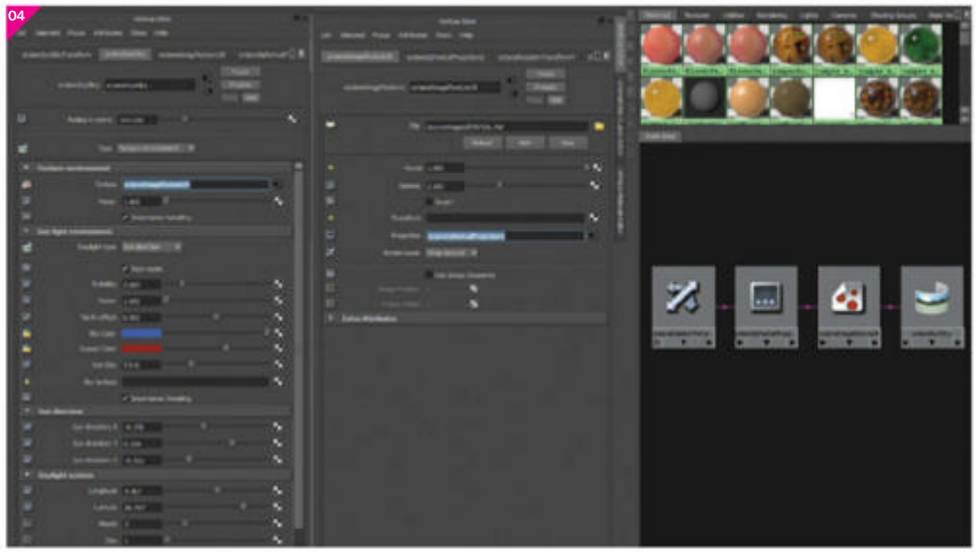
03 Add a Sun/Sky node From the Octane shelf, add an Octane Sun/Sky Environment. In the Attribute Editor for octaneSunSky you can set the Type to Texture environment as an IBL texture, or set to Day light environment to use the procedural Octane physical sun – we prefer using Texture environment. Click on the icon next to Texture to load an HDR image. Pick Octane Image Texture from the Create Render Node window. Then, use the File field to select your HDR image. Click on the texture next to Projection and add a spherical projection node. In the Attribute Editor for SphericalProjection click on Octane Full Transform. You can use this node to position and rotate your IBL image.

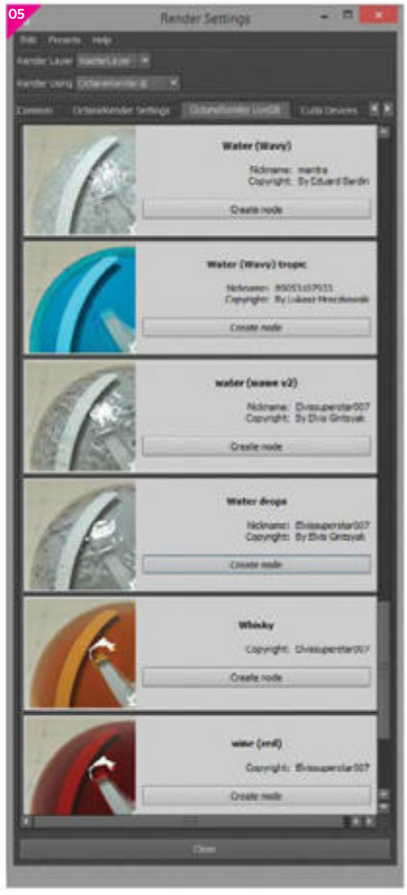
04 View your render Open up the Render View window and choose Render>Snapshot>Camera 1 to set the test render camera, and now you'll see a wireframe of your scene. Click the IPR button to start a test render. It takes a moment to compile the geometry for the scene. Then you'll see the render appear and update. You can change lights, shaders, and the camera view and see the results. Occasionally you may need to press the IPR button to refresh the scene, this is usually when you need to move geometry or add a new object or shader. The statistics at the bottom show your progress. The render continues until the Max samples is reached. It will look grainy until you increase Max samples.

05 Load Octane Material Presets There's a database of user-created Octane materials accessible from within Maya. In the OctaneRender Settings tab of the Render Settings window turn on Enable LiveDB refresh (under Additional). Note: an internet connection is required. Switch to the Octane Live DB tab and click on the arrow to load the database. For the waterdrops in the scene, use the Water drops material in Organic>Liquids. Click on the Create node button to load and then select the material in Hypershade. Apply it to the geometry and press the IPR button in the Render View window to see the result.









Paint Effects shader script

This simple MEL script can be used to apply an Octane material to a number of selected Paint Effects strokes.

```
//Get list of selected strokes
string $selStrokes[]=`ls-sl`;
select -cl;

//Prompt user for name of Octane Material

string $button = `promptDialog – title "Select Octane Material"
        – message
          "type the name of the Octane Material you want to apply to selected strokes"
        – button "OK"
        – button "Cancel"
        – defaultButton "OK"`;

string $octMatName = `promptDialog -q`;

//Loop through list of strokes and apply named material
for ($i=0; $i<`size $selStrokes`; $i++)
{
//loop through selected brushes and connect octaneMaterial
connectAttr -force ($octMatName+".outColor")
($selStrokes[$i] + ".octMaterial");
};
```

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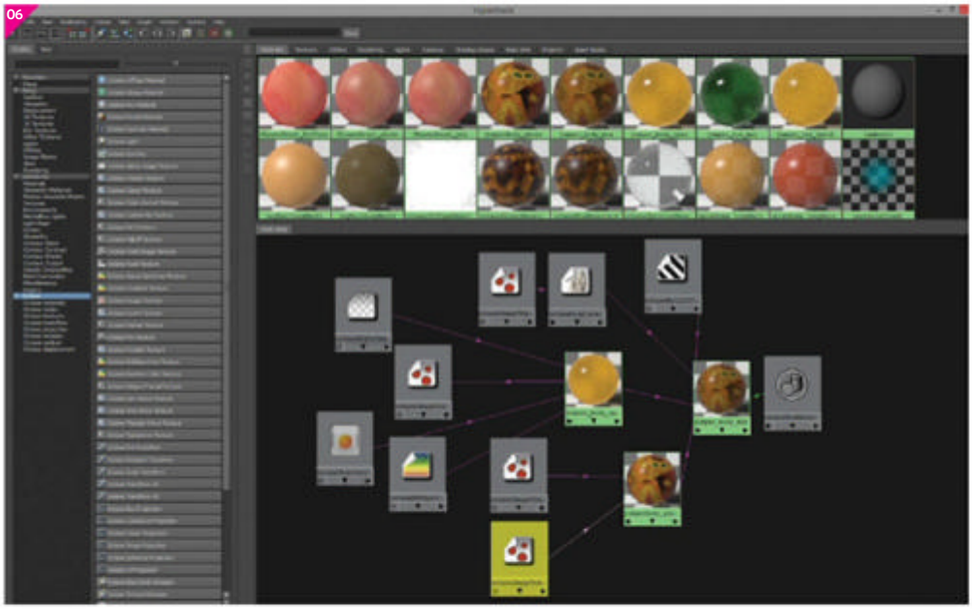
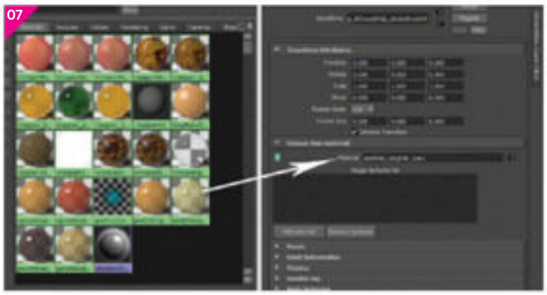
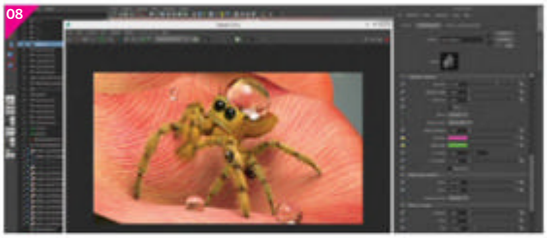
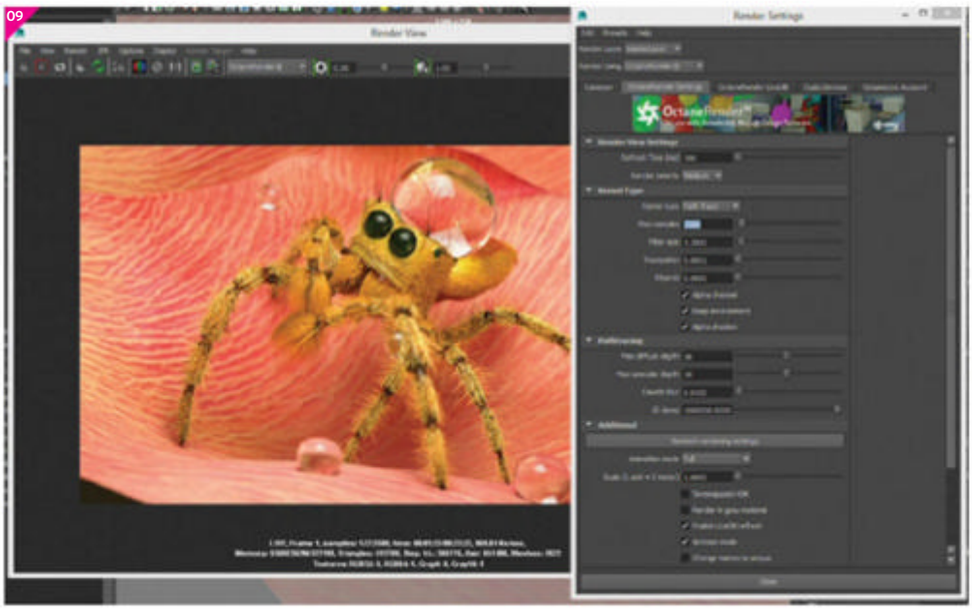






Set the Info Channel

If you would like to render an Ambient Occlusion, Z-Depth, Material ID, Normal, or other passes to use for compositing then make sure that you set the Kernel type in the Render Settings to Info Channel. In the Info Channel type menu select the type of pass you want to render. Specific settings for the channel are found just below the menu. For example if you want to create an Ambient Occlusion pass, set the Info Channel Type to Ambient Occlusion and then adjust to set the maximum AO distance. You can monitor the results in the Render View window using IPR.



06 Create custom materials In Hypershade click on Octane materials. The material types here include Diffuse, Glossy, Specular and Mix. We will use Specular for transparent or translucent materials, Glossy for shiny materials, and Diffuse for dull or rough materials and light-emitting objects. Mix material combines two other materials, their respective strength is controlled using a value or a texture. We have mixed a Specular and Glossy material to create the translucent spider, and used Diffuse material applied to a polygon plane to create an area light. Add an EXR texture of a soft light box to the Diffuse material's Emission channel to create a realistic light. Texture, Displacement and Normal maps can add a lot to the realism of the materials.

07 Apply shaders to Paint Effects and hair We've used Paint Effects strokes to create the hair for the spider (realistic spiders *must* have hair!). Octane can render Paint Effects without the need to convert the strokes into polygons. You must apply an Octane material to the Transform node of the stroke. Select it and in Attribute Editor expand Octane Hair material. Using the middle mouse button, drag Octane Material from Hypershade into the field to make the connection. If you have hundreds of strokes use an MEL script to make the process faster and easier – we created a simple script for this purpose.

08 Tune render using IPR When the materials have been applied and the camera is positioned, you can tune the look of the render using IPR. Select the camera and in the Octane imager section of the Attribute Editor use the Exposure and FStop settings to adjust exposure, allow time for the update in IPR to refresh as the image will get brighter as it renders. To simulate the colour response of real cameras, choose from the list in the Response menu. To add depth-of-field blurring raise the Aperture value and adjust the Focal Depth to set the area of focus (or activate Auto Focus).

09 Set options for final image For the final render, switch the render kernel and increase the Max samples. The Direct Lighting kernel, which you have been using thus far, is great for previews but to get photorealistic results use either Path Trace or PMC. Path Trace is the best but takes the longest time to render. PMC is best at handling caustics. The kernels have settings to determine how light reacts with scene objects. Max samples can be set to a figure between 2,000 and 4,000, higher values will mean longer render times. The default setting of 16,000 should be lowered. Save your scene and batch render to create the final image.

All tutorial files can be downloaded from: **filesilo.co.uk/3dartist**

Technique focus

Incredible 3D artists take us behind their artwork

MATERIALS & TEXTURING Most of the texturing was completed in Mudbox. From the hi-res sculpt, cavity maps are baked out and used in the texturing process. In Maya I used an HDR image for lighting. The material uses Displacement, Normal maps and a tiny bit of subsurface scattering (mainly in the gums and tongue) to bring it to life.

Jay Howse
artstation.com/artist/jay_howse

Jay is a 3D artist in the games industry. He is currently working on indie brawler, *Raging Justice*

Software Maya, Mudbox, Photoshop

Tyrannosaur, 2014

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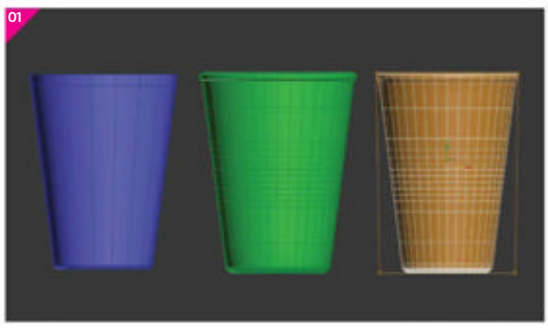
CORONA RENDERER

Render realistic glass in Corona

To make these clear, crisp-looking glass cups, we will be doing some basic modelling in 3ds Max. Then we will sculpt it in ZBrush to achieve the shape and contours of the cup, and a little polypainting and unwrapping too. We will finish by exporting to 3ds Max. This method was chosen because it makes our modelling faster and more efficient. After the modelling stage, we will then proceed in rendering using Corona (corona-renderer.com). This renderer is very quick and easy to learn, and it gives you more realistic output in terms of material and lighting, with only a few tweaks in the settings. We will be starting the render from scratch so that you will understand some basic lighting and some different approaches to achieve a realistic render. After we finish with the render, we will do some postproduction in Photoshop and After Effects. A video tutorial and a 3ds Max scene will be included on FileSilo so that you can have a better understanding of how the scene was set up and how to use Corona renderer in your own projects.

01 Model the crunch cup We will start the basic shape of the cup with a cylinder. From there we will add an editable poly and add little details to it by using Extrude, Chamfer, Shell and MeshSmooth. Remember to always use an Edit Poly Modifier every time you model, so that you don't need to do it from the beginning again if anything goes wrong with your model. We then use Swift Loop to connect edges and produce smooth edges when applying a MeshSmooth modifier. Take a look at the video tutorial to learn how to export and import properly from 3ds Max to ZBrush.

02 Sculpt in ZBrush We will start with masking the middle part with straight lines from the base on our model. Then Invert the mask by going to the Mask menu and clicking Invert. After that apply Inflate under the Deformation menu and once we get the bulge that we wanted we will then apply Polish, which is also inside of the Deformation menu, to smoothen all of the sharp edges. Next we will be using the Move and SnakeHook brush to achieve the crumple of the cup. Using those brushes, slowly move the middle side of the cup to make crumples based on our reference images.



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03 UV Master and polypainting

After sculpting the model, we can apply the UV Master plugin. Before that, go back to our lowest subdivision, then we can apply UV Master under Zplugin. Click Unwrap all. Now when it's done, we can activate polypaint under the Polypainting menu. For this model we can use masking to create nice, sharp colours. After polypainting, go to the UV Map menu, and choose 2,048 resolution. Then go to the Create Texture Map menu and click Create Texture Map From Polypaint. Once it's created, clone it, go to the Texture menu, flip the texture map and export as a JPG.

04 Export and import the model

Usually when we export ZBrush objects, we use the lowest subdivision. But this time we will just use the third highest subdivision since it's just going to be a still image. So in ZBrush we go to tools and click Export. Then go to 3ds Max, open File and choose Import.

05 Set up the scene

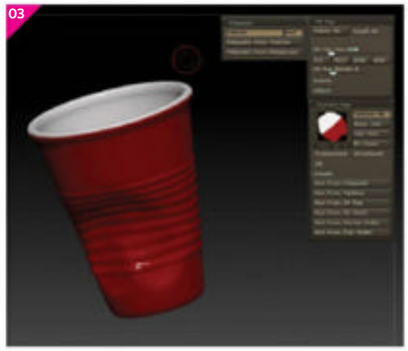
First we will use a Standard Camera then set the right angle for the shot. Add a box with a wood texture for the base of our cups Then we will check the gamma in 3ds Max via Customize>Preferences>Gamma>LUT, and set this to 2.2. Now let's open the Render tab and select CoronaRenderer. For this scene the settings are pretty much all default since it works perfectly fine and optimises our render. If you hover your mouse to the values it will show the descriptions in it. We will be using a pt+pt under Corona's main settings and some WireColor and Z-Depth pass under Elements. A plane with CoronaLight material (with a kitchen texture map) was used to make the walls surrounding the glass model, this was also used as our background and reflection.

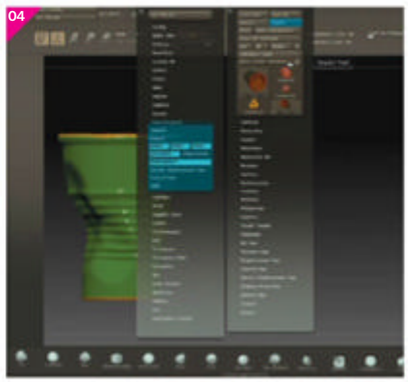
06 Texture the crunch cup

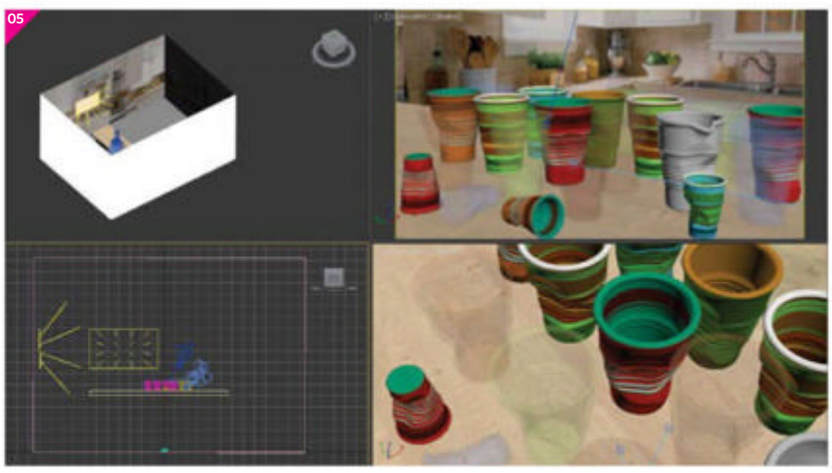
For texturing the first cup, we will use the standard Corona material with Reflection set to 1.0, its Fresnel IOR set to 1.6, and its Glossiness set to 1.0. Then set Diffuse to the colour red. Next, make sure Refraction is set to 1.0 with a black colour, its IOR set to 1.5, and its Glossiness set to 1.0. With these materials we can now duplicate the cup on another slot and just change the Diffuse colour for the other different proxy cups. For the other cup with Unwrap UVs, we will load up the texture maps that we saved earlier on when we were in ZBrush. The settings now will be a little different from the first cups. So set Reflection to 1.0 with Corona Solid Tex as a white colour, then change its Fresnel to 2.0 and its Glossiness at 0.84. Move on to Refraction and set that to 1.0 with a black colour, with its IOR set to 1.6 and its Glossiness set to 1.0 After we set up the texture, we will then rotate it randomly to add variation in the shot.

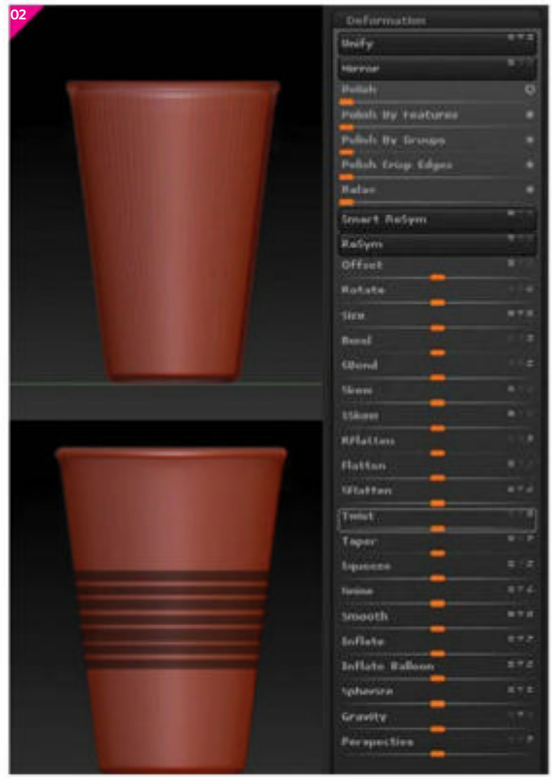
Corona settings

The default Corona settings will work mostly in every scene. If you're rendering an exterior scene you can use pt+pt under Main Settings>Global illumination and pt+hd for interiors. You can also tweak the depth of field and scene cameras under Global Camera Settings, but usually I just enable the Depth of Field and change the blades for the bokeh.









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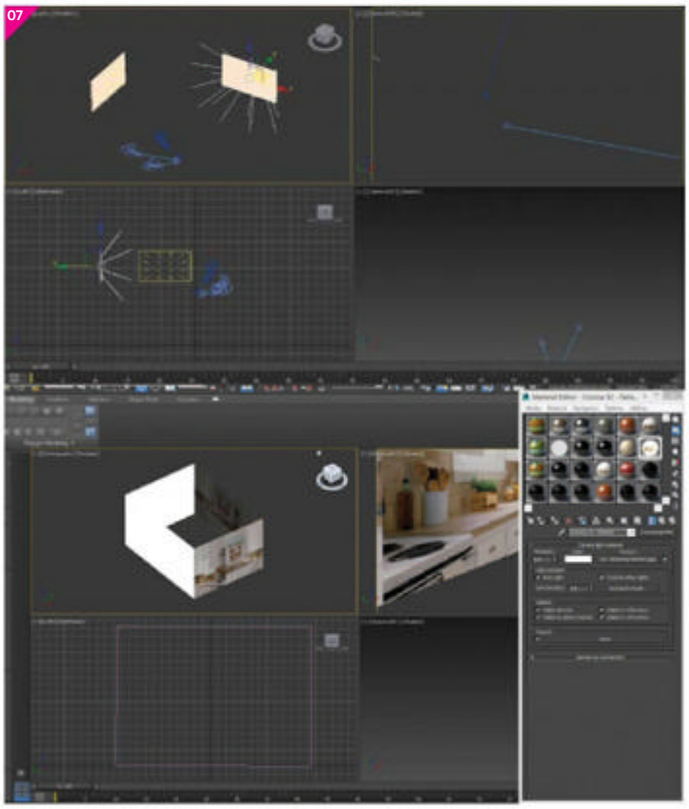
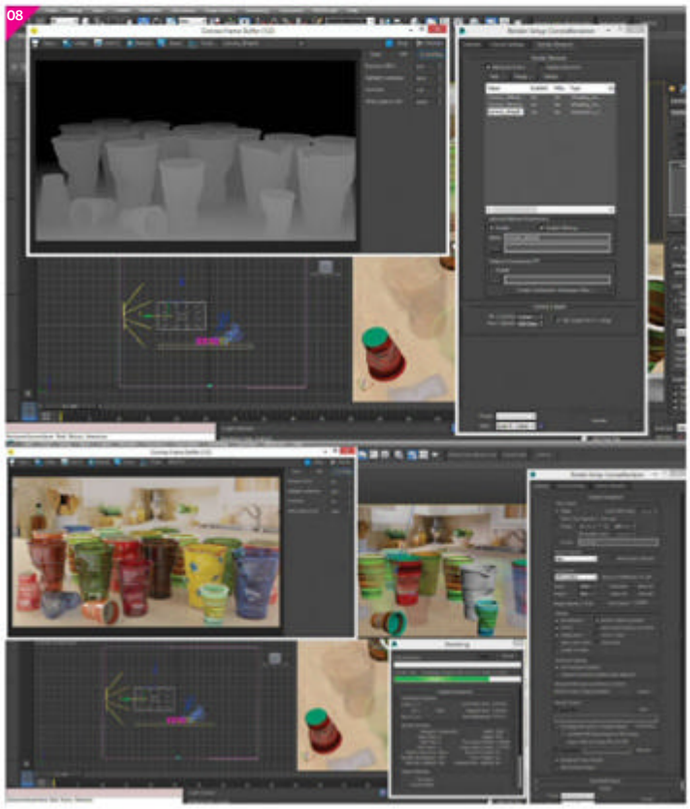




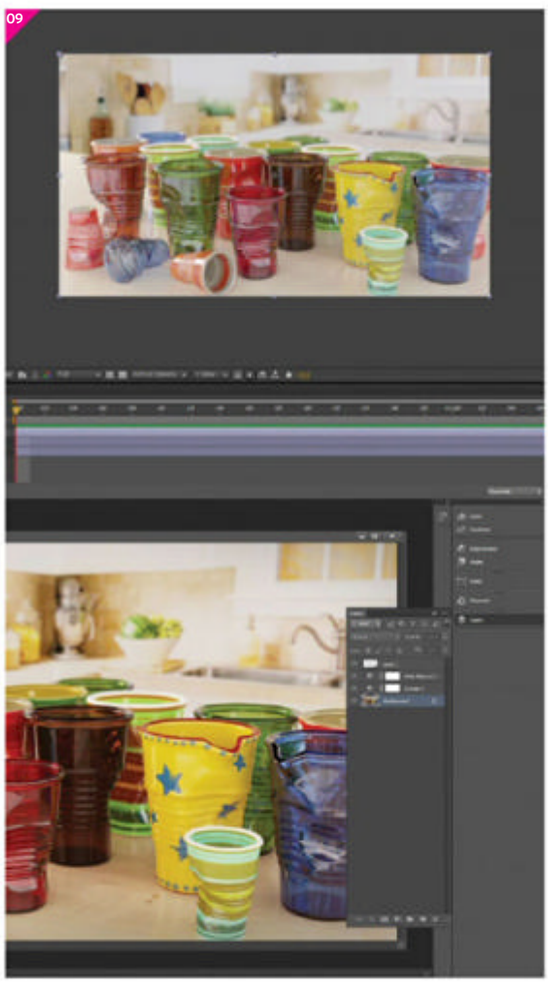
07 CoronaLight materials There are different ways to light up a scene. But always keep in mind that you need to put your lights in the right position to reflect how a real interior light works. This is so that you don't have any weird lighting results on your image. For this, we will be using two Corona plane lights to be our source for the main lights, one on the left side with an intensity of 50 and one on the front with an intensity of 10 – these lights will be our windows. Now we will put a CoronaLight material on two planes with the multiplier of 5, and this will give us the reflection from our cups. The other two planes at the back will be our background with just a standard Corona material.

08 Test renders Every time you do a test render you should always practice rendering the elements, so that you can put the right amount of Z-Depth pass or Ambient Occlusion when you render the final high-res image. If you click the Render button, another window will show up showing the progress of the image. From here you can adjust the contrast of the render under ColorMap, play around with the settings, and also set the Exposure to 0.0, Highlight Compression to 50, Contrast to 1.0 and White balance to a number between 4,500 to 7,000. Once you're satisfied with the render you can now click the Cancel button and click Steady on the Save icon and click 'Save all' to save the image and its elements.

09 Postproduction in Photoshop and AE Before we do some editing in Photoshop, we will take the raw image and the Z-Depth in After Effects to apply some depth of field using the plugin Lenscare. Go to File>Open project and select the raw image and Z-Depth pass, then drag the images onto the empty Composition window one by one. Then go to Layer>New>Adjustment Layer. Add an effect on the Adjustment Layer by going to Effect>Frischluft. Under the effect controls in the Adjustment Layer, apply the Z-Depth that is in the depth layer with a radius of 10 or any value that you think you like. Once we're satisfied with the depth-of-field effect, we will go to Photoshop. For this image the colour correction is pretty much minimal, we will just add some adjustment layers with curves and a little contrast. Voila, we now have a photorealistic crunch cup!

Real-time dof vs Z-Depth

Take note that if you use real-time dof in Corona, the render time will be longer and you cannot change the depth of the image anymore in postproduction. But what if you render the image without the real-time dof and render with the right Z-Depth pass? You will get more control of the focus distance that you want on your image, especially when using Lenscare in After Effects.



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MAYA, MUDBOX, PHOTOSHOP

Texture a hotrod vehicle render

Last year **3D Artist** and Humster3D organised the 3D Vehicle Render Challenge. The winner, Jochem Aarts explains the process behind his Hotrod Speedshop award-winner, "Like a lot of people, I like nice cars. Especially the big American ones from the Fifties and Sixties. So when I read about this competition I had the feeling I should go for it.

"The goal was simple: create a render with a car. The rest was up to the competitors. Although it sounds very simple, it's pretty hard because there are no guidelines or rules. Just make a cool-looking render, and may the best render win. You can use any technique, as long as it's 3D (you had to send a screenshot of your 3D scene or clay render). As you could use premodelled cars, there were going to be lots of competitors.

"After spending about six days modelling, texturing and shading, the Hotrod Speedshop render was completed and sent to the competitor's gallery. Of course you hope you will win, but there was a lot of great artwork posted already. And the chance was getting smaller because more and more artwork was posted. A few weeks later I was contacted by one of the jury members. He told me the great news that I was one of the prize winners. Never before had I taken part in competitions like this, so I was pretty flabbergasted!"

This tutorial shows the making of Hotrod Speedshop from the start to the end. It covers the most important steps to create great renders and what it takes to get there.

We start with doing some research, so that we know what we are actually going to make. This is also one of the most important steps in the total process. We then take a look at modelling and texturing and in the end we import all of the renders into Photoshop for postproduction and create the final victorious image.

01 Research For competitions, it's a good idea to take a look at what the competitors are making. The time span for this competition is important too, you should make sure that you don't submit in the first weeks and see what others submit. In this competition most contestants took (premade) Ferraris, Lamborghinis or other futuristic-looking cars and placed them on a photo background. So the first immediate step is to *not* use a photo background with a $300,000 car in front of it. Stand out from the crowd, that's always important. If everybody is using a new car, create an old one. If they all use a photo background, create your own. Here we are creating one of the most iconic hotrods, the Ford Deuce '34, but a customised one of course. So, the first thing to do is find reference images of this car. But, don't get too excited and start modelling right away! Cars have their form for a reason, they need to be functional, but nothing is placed simply because it looks nice there. To create a believable hotrod we have to find reference images. The second thing that we will do now is find some reference images for the speed shop. For the final image we want to create a vintage-looking gas station or speed shop, so search for some typical elements that were used in older eras. For example, in the Sixties they had characteristic gas pumps – we will be putting these into the image, so search for some extra references of old gas pumps. The final component is the flames on the side on the car. Rather than classic flames, use True Fire because it looks a little bit more aggressive, and it fits the car better.

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02 Model the hotrod Start with modelling the bodywork and use the reference image as a background for the right proportions. It's important to use a clean edge flow. This might come in handy when UV mapping the car, and it gives a better result when smoothing the mesh. After that, start the wheels. The front and back wheels have the same rims, only the back tires are a little wider. Build all of the details like the engine, headlights and gas piece by piece. When the car is built, use a simple planar mapping on the side of the car and start to create the texture map for it – we've made it in Photoshop. With some simple brushes, create several base layers and on top create some extra layers with the blending model for highlights. This texture was the base colour for the car paint shader. When the main car is done, build another but this time as a low poly model. This car will be in the garage at the back. It will be blurred out so you don't need as much detail on it as the car on the front. Using the same car doesn't look right so a different one was used for the garage car.

03 Model the speed shop The speed shop itself is as simple as it gets. It's just a box with a hole in it which is the door. It will be blurred out in the depth of field, so don't spend too much time on it. The gas pump was more important, because it will be directly placed behind the car so use the reference images to model the mesh. Photos of old signs were used to decorate the speed shop. When the mesh was done, Mudbox was used to texture it. Pay attention to details when texturing. Scratches and worn paint will add realism to the image. In Mudbox keep everything on separate layers, so changes can be made easily. A gas station is nothing without empty old oil drums, which are simple cylinders with two extra ridges in the middle. In Mudbox, paint a base colour with layers on top of old oil, scratches and rust. To have some variation in the scene we made three different textures of the oil drum. Ivy Generator was used to generate some vegetation growing onto the garage, with a custom shader for the leaves that have some translucence like real vegetation does. These leaves are two-sided materials. The lighter texture goes in the translucence channel set to 0.25, with a multiplyDivide node on it set to '4. 0.250 x 4 = 1'. This is so that light can pass through, but it's not transparent. The other vegetation was made with Maya Paint Effects. Then convert to polygons and attach the same Ivy Shader.

04 Block the scene All assets are built, now it's time to put it all together into a composition. Try to use the Rule of Thirds, but with this composition it's not working. You can use an old trick of making a screengrab and flip it. The Rule of Thirds is working much better in this composition now. The front of the car is on two thirds from left to right, and also from top to bottom. But now there is little room on the top and bottom of the image. The foliage on the left is then set to a minimum, so that there is more room around the car. The background is more visible this way. Now add some details, and place some stones and grass patches to break up the straight lines. This way you can add life to images.

05 Lighting and rendering Now use the standard mental ray Physical Sun and Sky system. The sunlight is the only light used in the scene. A texture was used in the environment slot for some reflection in the car paint and chrome, but not for lighting. If you use mia_material_x_passes shaders you can render different passes without much effort in mental ray. For easy postproduction, render several passes to have maximum control on shadows, specular and reflections. In Photoshop stack all the render layers and add a different sky and some trees in the background to create a little more depth. On the colour layer do some basic colour corrections with Curves, Levels and add a blue photo filter to give the image an outdoors look. Tweak the Specular, Refraction and Reflection layers to make the highlights pop out a little more. The Ambient Occlusion layer was added to create some extra dark shadows. Use a blue photo filter on the AO layer to create a more realistic shadow colour. Then add some dirt on the wheels because the car stands on sand, so there must be sand on the tires. After applying the Z-Depth with the LensBlur, do a little Chromatic Aberration, Vignetting and a small LensDistort with PhotoLooks to finish it up.

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LIGHTWAVE, ZBRUSH

Model and texture a slimy snail

Before starting, always look for reference images around the web – in this case of snails. This will serve as a guide when re-creating the irregularities and viscosity of the snail skin to ultimately produce the most realistic result possible. We'll be using LightWave 3D 2015, ZBrush and Photoshop for this tutorial.

In terms of surrealism, it's important to represent situations that tell a story, even if the image is apparently senseless at first – as long as they are rich in conceptual contrasts that really capture the spectator's attention.

On this occasion, we wanted to create a black-and-white image that really showcased the drama that was about to occur. Working in black and white provides another challenge: it really teaches you to become more aware of tonal contrasts, because we suddenly only have a scale of greys to work with. Though there are many types of grey, it is still difficult to combine them while at the same time avoiding all the greys mixing together and making the image too uniform.

This project is not complicated to re-create, but you need to be very attentive to details and lighting to be successful. With lighting in particular, it is important to adapt the illumination of the piece to the subject, making all the imperfections of the shell as evident as the ones on the skin. We position both Linear and Point lights strategically to let this happen. With LightWave we can create the shell of the snail surprisingly easily with a native tool, the Seashell, which will enable us to determine various elements.

In the LightWave Modeler, we'll start to block out the mollusc starting from a simple rectangular primitive, in which we'll define the form of the body as well as the antennae. We'll then bring everything into ZBrush with the help of GoZ – a hugely practical tool when working between LightWave and ZBrush and vice versa. In ZBrush, we'll start to perfect the form and define the final proportions.

Sometimes creating UVs in 3D software is not at all simple, especially when it comes to complex models or as in this case, organic forms. We'll see how easy and fast it is with ZBrush's native plugin, UV Master.

We'll discover the great advantages that come from sculpting with Alphas, a fundamental technique to reach a high level of detail in just a few seconds. Then we will learn how to extrapolate the Maps of the work we've done in ZBrush, and how to then send everything to Layout, once again with the help of GoZ.

Remember, that there is an accompanying video that lasts over 14 minutes, where you'll be able to see this workflow in even more detail from the beginning, where we get into ZBrush, create the various maps and use GoZ. As this was a tutorial in only six steps, we have mostly focused on the modelling process and how to add details to the skin.

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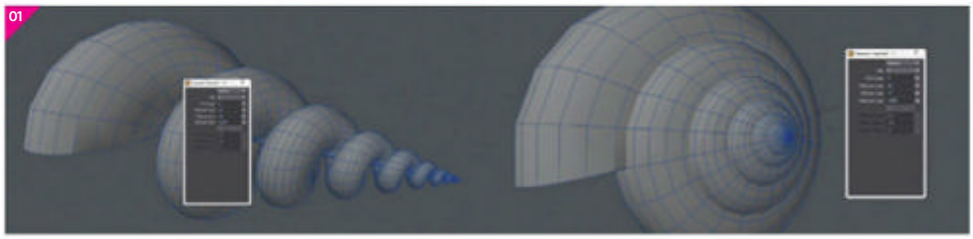

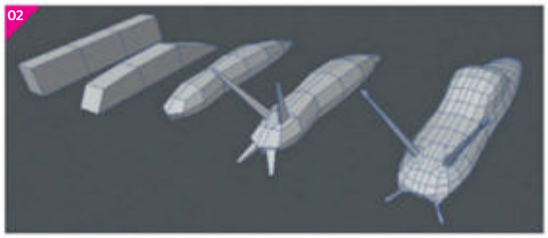

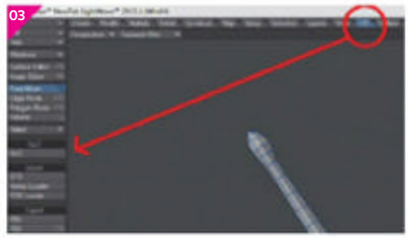

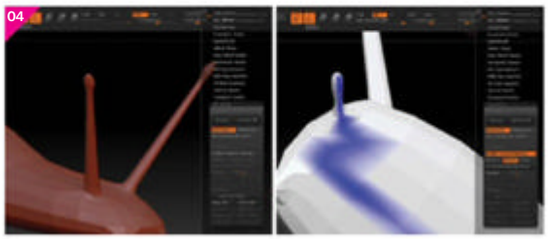

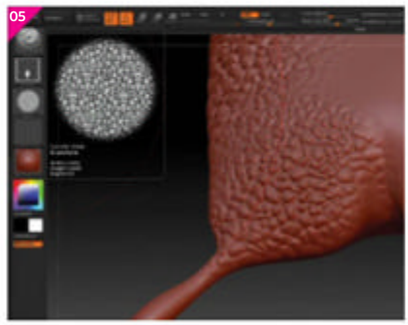

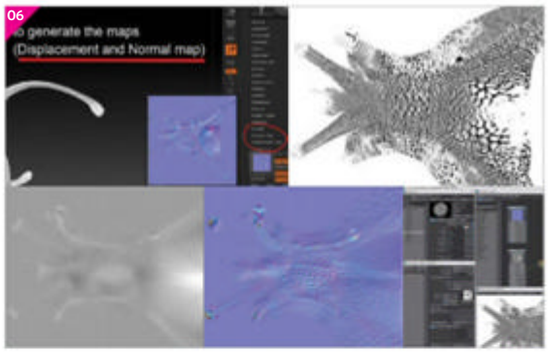

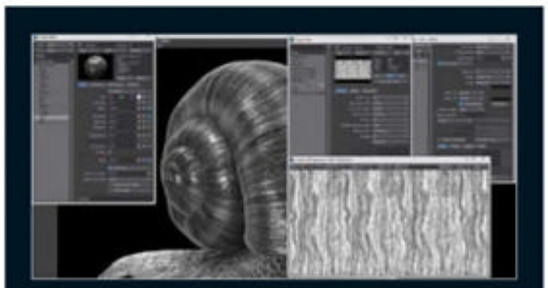

Shading and lighting

Having done a great job in ZBrush means nothing if you don't illuminate your image strategically so that your sculpted details stand out. To do this, use an HDRI as a base illumination, then create a principle source of light called 'Sun' or 'KeyLight'. Next, position another light behind the snail almost opposite the camera to enhance its silhouette – make sure this silhouette light doesn't cast shadows to avoid confusion. Then carefully position various Point Lights and Linear Lights for the Specular of your snail. This will help you to highlight the wrinkles and viscosity of the skin, as well as the shell's spiral.

01 Model the shell Open the LightWave Modeler and go to the Create menu, where you should be able to see a tool called Disc. Create a circular shape in the y axis, and make sure it has a large diameter – this is so that when we later activate the Seashell tool we'll be able to change the number settings on it by the millimetre. From the top view, move the circle to the side of the grid, making sure it doesn't remain in the centre. In the top menu bar, select Multiply/Extended/Seashell. Now press N to create a default shell. You can modify this shell by changing the values in the settings window that has popped up when activating the tool. Try to experiment with options such as the subdivisions or number of loops and more until you've obtained the form that you want.

02 Model the mollusc Modelling the mollusc is very easy. First, create a rectangular primitive and then press F2 to centre the object on the axes. Then activate symmetry, and Shift+D to open a window that lets you choose between three types of subdivision. Select Metaform, which will give you an optimal directional polygon flow. Now give your snail some form by moving vertices with the Drag tool (Shift+G). Extrude the antennae with the Bevel tool by selecting the exact place where you want the antennae to go and pressing B to extrude. Do this for both the upper and lower antennae.

03 LightWave to ZBrush Once you've obtained a base mesh that you're happy with, save the object and prepare to export into ZBrush. Creating the UVs in LightWave does not involve any problems as the available tools are very powerful. On the top of the LightWave menu, find I/O then in the side bar click on GoZ. GoZ works by creating a bridge between the two pieces of software, instantly synchronising all the changes that we are going to make.

04 UV Master In ZBrush, go to the top menu and look for Zplugins/UV Master. In the window that pops up select Work On Clone (here you can see that you've created a clone, distinguishable by the letters CL that now come in front of its name), then enable Control Paint. We'll be using this tool to determine the zones we want to leave whole and those where we want to make seams that determine the cuts in the UVs. Select the Attract button to highlight the lines you'd like to encourage and concentrate seam creation in on your model. These will be in a blue colour. Select Protect to then highlight the zones in red that you want to protect, or discourage seam creation in. Now press Unwrap and in just a few seconds you'll create UVs that you can look at by clicking the Flatten button. Copy the UVs with CopyUVs, select the original model and click PasteUVs.

05 Sculpt details Subdivide the model as much as possible for your PC by clicking Geometry/Divide. Go to Stroke, select DragRect, and load the Alpha images that you can find in the accompanying FileSilo files for this tutorial. Now you can sculpt the details by changing the dimensions and rotation of the textures according to your working zone. Try to sculpt in a homogeneous manner – avoid leaving zones without detail. Use a much weaker brush strength with the antennae, as they are much thinner. For optimal results, vary the type of Alphas used so that your snail's skin is more realistic.

06 Make maps and export In the Tool column find UVMap to determine the type of resolution you need to have. With the model at its highest resolution, create the Cavity Map. Next, lower the amount of subdivisions on your model to the minimum to then create the Displacement and Normal maps which can be found in the Tool column. If you've done everything correctly, go back to GoZ to then export to LightWave, but make sure that the destination is Layout and not Modeler – this will guarantee the Normal and Displacement maps to work in the best possible quality, and the results will then be very loyal to what you've done in ZBrush.

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Lenovo ThinkStation P900

This ultrahigh-end workstation offers 40 cores of performance. Is it the new performance king?

BELOW The P900 is Lenovo's top-end workstation, with lots of possible configurations

The P900 is the top-end model from Lenovo's updated ThinkStation desktop workstation range, which now comes with the latest Intel Xeon processors, DDR4 memory and the most up-to-date Quadro graphics cards from Nvidia.

From the front it looks very similar to the P500, featuring the same FLEX Bay at the front, a fancy term for a good-looking customisable front panel that juts out, housing four USB 3.0 ports, a card reader and the power switch. But the case is considerably deeper, stretching back well over half a metre, accounted for by the wide range of hardware expansion it supports.

Although prices start at £1,640 ex VAT for a single-processor P900, a modest configuration with a single 1.6GHz Intel Xeon chip, Lenovo cranked almost every dial to the absolute maximum with the review sample it sent to us, cramming in as much high-end rendering hardware as it could.

Dual 3.1GHz Xeon E5-2687W v3 processors are the star attraction, each of which has 25MB cache and ten cores, 20 with Hyper-Threading, for a grand total of 40.

There's also a whopping 128GB of DDR4 memory, the most we've ever seen in a single workstation. An 8GB Nvidia Quadro K5200 is the final part of the P900's main hardware, a graphics card we'd personally choose over the top-end K6000, given the K6000's slim performance improvement doesn't quite warrant the large extra premium it carries.

This is a particularly welcome saving, because the retail cost of this fully loaded P900 configuration comes to £12,157 (inc VAT), placing it in the same elite class of workstation that's occupied by monsters such as HP's Z820, Scan's 3XS GW-HTX35 and mortgage deposits.

And you could add yet more hardware. As well as the aforementioned Quadro K6000, you can have a Tesla K20 or K40 fitted, or opt for dual Quadro K5200 cards.

Another notable aspect of the P900's hardware is Lenovo's inclusion of M.2 storage via a SanDisk 512GB SSD, coupled with a 4TB hard disk. If you're unaware of this technology, M.2 is a new connector for PCs that hooks up to four lanes of the PCI Express bus, enabling better potential speeds than possible from a traditional 2.5-inch SATA SSD.

As we've seen before, having 40 cores means great rendering times for heavily multithreaded applications, such as 3ds Max and also tasks such as video encoding.

This is evident from our benchmark results. The P900 chewed through our 1080p 3ds Max render in just 5 minutes 53 seconds, just shy of the HP Z820's record 5 minutes 51 seconds, and the

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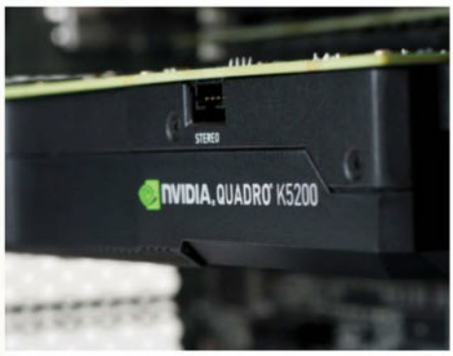
> Having 40 cores means great rendering times for heavily multithreaded applications

ABOVE Our review sample came equipped with dual ten-core Xeon processors, but more affordable configurations are available

ABOVE Such a large number of cores makes mincemeat out of heavily multithreaded software like 3ds Max



ABOVE The Nvidia Quadro K5200 in the ThinkStation can be added to for empowered performance

ABOVE The FLEX bay at the front offers easy access to external peripherals such as the optical drive and USB ports

CINEBENCH 15 CPU score of 3,038 points is the best we've seen.

But in other tasks, the results are slightly different. The P900 did fantastically well in CINEBENCH OpenGL, managing 168FPS, but it's not a record-breaking score. Neither is the SPECviewperf result – Scan's K6000-equipped GW-HTX35 just pips the P900 in every test. Although the P900's performance is nothing to complain about, it seems the 3.1GHz processors slightly struggle to keep up with chips that run at a faster clock speed.

The M.2 storage isn't as fast as we hoped. The sequential read speed of 411MB per second and write speed of 399MB per second came out slower than many modern 2.5-inch SATA SSDs.

In all the P900 is a fast system that's better as a specialised tool for artists working on particularly complex multithreaded rendering projects, rather than as a general purpose workstation. It's surprising that it didn't break every record going. We were expecting to be blown away, but it seems the reality of the P900 is more complicated.

Orestis Bastounis

Essential info

Price	£12,157 inc VAT, £10,131 ex VAT
Website	shop.lenovo.com
CPU	2x Intel Xeon E-2687W (3.1GHz, 3.5GHz Turbo)
SSD	512GB SanDisk M.2
GPU	Nvidia Quadro K5200
Memory	128GB DDR4
Storage	4TB hard disk

Summary

★★★★★ **Features**
★★★★☆ **Performance**
★★★★★ **Design**
★★★☆☆ **Value for money**

Verdict ★★★★☆

It may not have won all of our tests, but the P900 still offers rock solid results in graphics and single-threaded software, with outstanding multithreaded performance.

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HP Z440 Workstation

HP's newest addition to its mid-range collection has the potential to expand to great lengths

HP never fails to update its workstation line-up as soon as new technology becomes available, and the Z440 is a new mid-range desktop that puts Nvidia and Intel's latest components to work.

It comes with the quad-core Intel Xeon E5-1630 v3 processor that was released during the latter half of 2014, as part of the Haswell-E line-up, which also saw the release of the X99 chipset. The Z440 uses its server variant, Intel's C612.

DDR4 memory is one of the key new features of X99, with HP using 16GB in the configuration sent to us. Although DDR4 slightly raises latencies and the overall price of a workstation, it still leads to better overall performance due to running at faster clock speeds. HP has opted for the lower end of DDR4 speed grading, with 2133MHz modules, but even that should mean improved performance over DDR3. Other X99 features include additional PCI Express lanes, greater overall memory bandwidth and more USB 3.0 ports.

The Xeon E5-1630 runs at 3.7GHz, and being a quad-core, eight-thread Haswell processor, offers roughly similar rendering performance to a Core i7. But Xeon provide a few extras, such as support for error-correcting ECC registered memory, which is an upgrade option.

The final component to complete the Z440's specification is an Nvidia Quadro K2200, one of the firm's mid-range cards, refreshed as of last year. It packs 640 CUDA cores, 4GB of GDDR5 memory and 1.3TFLOPS of performance.

We always look at upgrade options, and if you're willing to pay for even better rendering performance, there's plenty available for the Z440. The CPU can be swapped for an eight-core Xeon (the 3.2GHz E5-1680 option looks particularly lovely) and there are graphics cards aplenty from the likes of both AMD and Nvidia, including some top-of-the-range models.

The maximum memory you can order is 128GB, thanks to the eight DIMM slots on the motherboard. And while HP sent us a Z440 with a reasonable storage configuration of a 256GB SSD and 1TB hard disk, you can opt for more disk storage or an HP Z Drive – a fast, PCI Express SSD.

All these upgrades could cause the Z440's cost to balloon, of course, which almost defeats the point. With faster memory, a solid processor and an upgraded GPU, you're getting better performance across the board for roughly the same cash as last year's mid-range workstations. But how much better is the performance? That's where our testing comes in. The Z440 is roughly comparable with other mid-range systems we've reviewed over the last year. Dell's Precision T5810 uses DDR4 memory and a very similar Xeon CPU, so it should offer a similar level of performance in CPU-based tasks to the Z440, while the older T5610 used the earlier Quadro K2000.

From SPECviewperf, it's clear the K2200's extra memory and shader hardware are great benefits. Scores doubled across the board in comparison to the K2000, helped by the 3.7GHz chip's additional CPU power over the 2.5GHz T5610.

With 3ds Max, performance is only slightly better than Dell's T5180, which is to be expected

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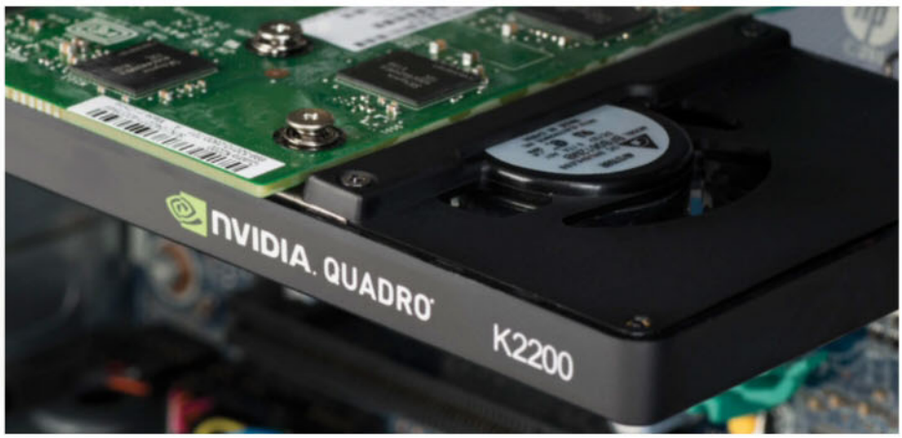
> You're getting a better performance across the board for roughly the same cash as last year's mid-range workstations

ABOVE When filled with DDR4 memory the new chipset improves performance across the board

LEFT Some upgrade options will offer a real performance boost

BELOW The K2200 has a 3.7GHz chip – an improvement over the K2000

ABOVE HP's corporate desktop chassis design looks great



given the Xeon E5 processors are both part of the same family. The Z440 certainly ploughed through the standard Underwater render in 4 minutes 8 seconds, and the HDTV render in 15 minutes, 44 seconds, which was about 15 per cent faster. These render times are both very much in line with the Z440's higher clock speed.

It's clear the Z440 offers a good performance improvement over last year's mid-range systems, but a carefully chosen upgrade, perhaps adding a new graphics card or upgrading to an eight-core CPU, could turn it into a system to really compete with the more high-end machines.

Orestis Bastounis

Essential info

Price	£1,706 / €1,900
Website	www8.hp.com/us/en/campaigns/workstations/z440.html
CPU	Intel Xeon E5-1630 v3
Chipset	Intel C612
GPU	Nvidia Quadro K2200
RAM	16GB 2133Mhz DDR4
OS	Windows 8.1
Storage	256GB SSD, 2TB hard disk

Summary

Features ★★★★☆
Performance ★★★★½
Design ★★★½☆
Value for money ★★★★½

Verdict ★★★★☆

The Z440 raises the bar for mid-range performance and provides a good upgrade path if you need even more power in your machine

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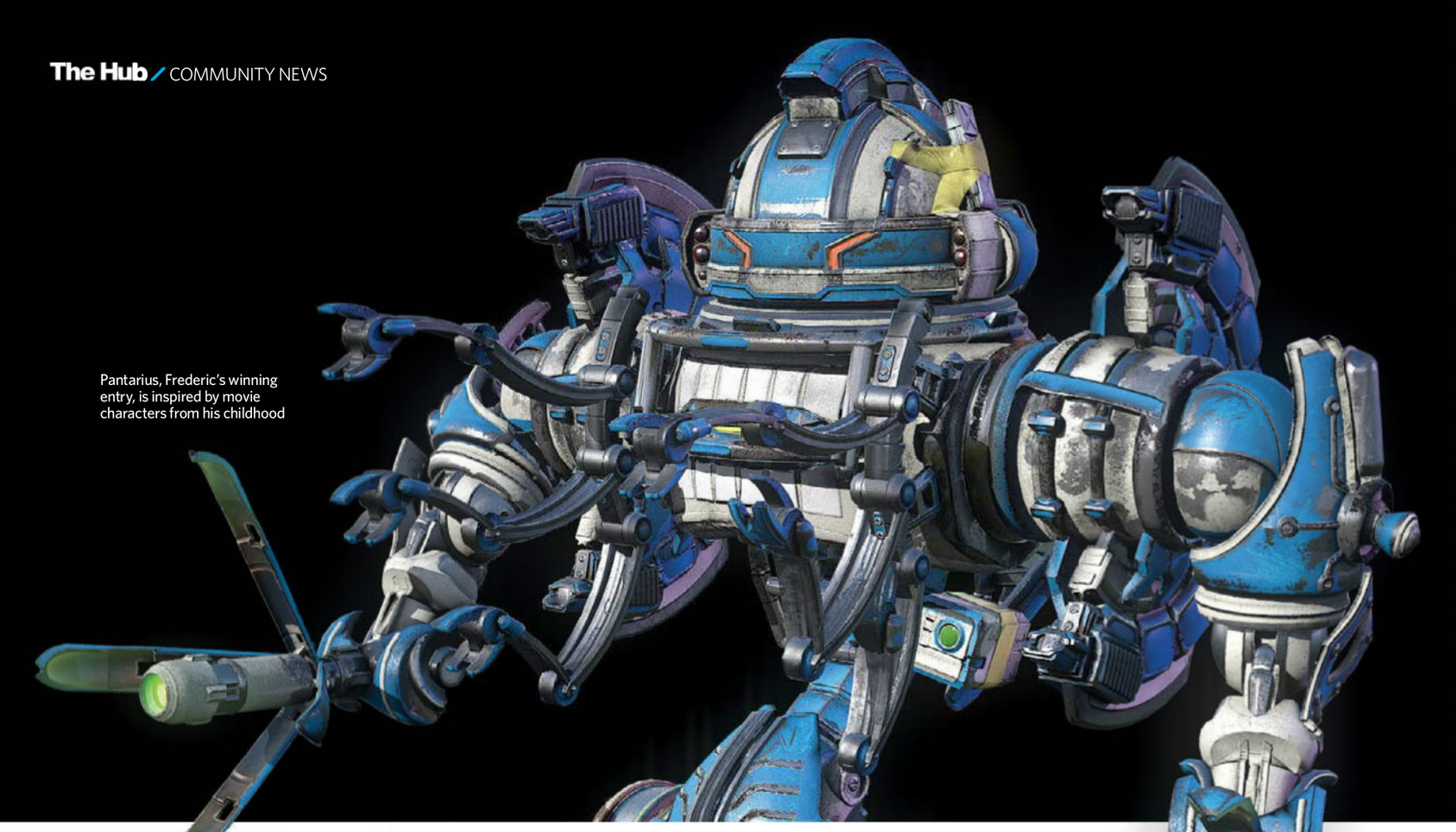

Pantarius, Frederic's winning entry, is inspired by movie characters from his childhood

The design behind prize-winning robots

We talk to the three victors of the 3D Squirrel 3D Robot Challenge to learn about creating unique sci-fi design

Bessy shows off Pantarius' model. It helped him achieve first place and a bundle of prizes in the challenge

1st Place Frederic Bessy

What were your main challenges in the competition?
Well, I'm really bad at mechanical design. Sometimes when I think I have a good design idea, I try to put it on paper, but it goes wrong! Trying to compensate this by playing with shapes during the modelling process was a challenge.

Can you reveal your workflow for Pantarius?
After the rough sketch was done, the first step consisted of building a much more complex model. That's where 3D-Coat came into play. I made the high-poly model with Boolean functions (so subtracting a shape from another one to get a more complicated shape). After sculpting the hard surface model parts, I retopologised and organised each part's UV island to match a 2,048 by 2,048 pixel texture. I baked all high-poly parts onto the low-poly model in xNormal one by one to get a Normal map, an AO and others for Quixel Suite for texturing. I used Marmoset Toolbag for final renders.

2nd Place Vahid Ghobadi Arfaei

What software did you use to create your 3D robot?
I used 3ds Max, V-Ray and Photoshop. I love working with 3ds Max. For my personal modelling work I've never used any plugins, scripts or stock 3D models – I think they kill my creativity. Every time I find a challenge I try to find a way and solve it with 3ds Max's tools. 'There's always a way', is my technique.

How did you find the inspiration to design such a unique piece of hard-surface modelling work?
First of all I imagined a little story. I imagined his personality and appearance. I then sketched a simple model and made a simple model in 3ds Max. Finally, I added details and sometimes remodelled some parts.

3rd Place Alan Guyant

What do you feel was the most important thing you learned from having entered and won at the 3D Robot Challenge?
I think I've learned [that going through the process of] planning is very important when making a 3D model, I very rarely draw out and design my projects before starting any work on them prior to entering this contest, and now I've started to do it.

If you could give advice to other artists hoping to create their original robot designs, what would it be?
I'd say don't let the topology tell you what to do, make the topology do what you want it to do. Always try to learn new things, there's seemingly always useful stuff you don't know, no matter how long you've been modelling. Remember that details are probably the most important parts of your model.

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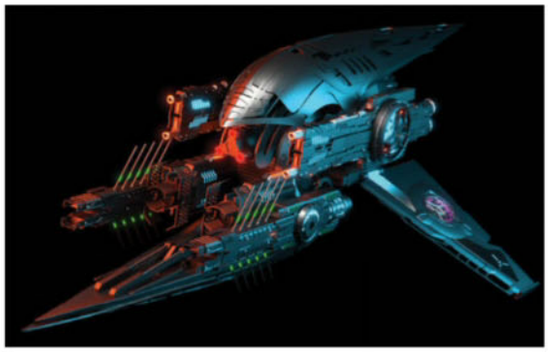


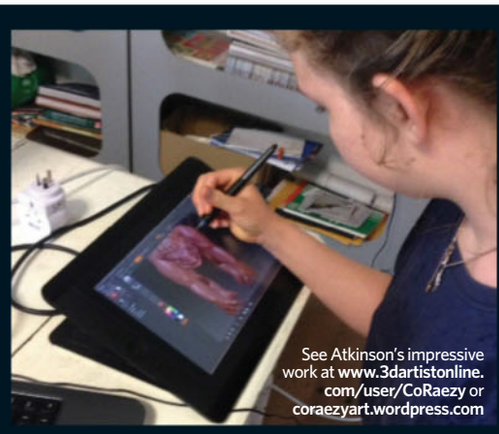
TOP "Don't confuse yourself with what software is better and what software is worse," advises Arfaei. "I know artists who create great concepts with just a pencil"

LEFT "I've learned that it's quite important to have at least a general idea down on paper or drawn in 2D graphics software before you begin," reveals Guyant after submitting his winning Hunter Drone entry

BOTTOM Arfaei's model won him second place in 3D Squirrel's competition, the process of which taught him the sheer importance of time management

"Sometimes when I think I have a good design idea, I try to put it on paper, but it goes wrong! Trying to compensate by playing with shapes was a challenge"

Frederic Bessy, 3D designer



See Atkinson's impressive work at **www.3dartistonline.com/user/CoRaezy** or **coraezyart.wordpress.com**

ZBrush at 17

Teenager Coco Rae Atkinson gives an insight into the next 3D artist generation

For many 3D artists working in the industry today, creating CGI was never considered an option until at least university level. There's often a very good reason for this: as well as a lack of awareness that creating VFX can one day become a career, software like Maya, Blender or ZBrush is hardly a typical part of any high-school curriculum. This all combines to make it an imposing challenge to begin to learn on your own.

Coco Rae Atkinson is one of a new generation of young artists tackling that challenge now. Having lived in Thailand as well as Australia throughout her life, Atkinson has always been passionate about art, and just started studying ZBrush six months ago. At only 17, she has already created some impressive work.

"The first time I was inspired by 3D art was in June 2014," she says. "I was holidaying with my godparents in Australia. They run a VFX business called Studio Kite, one of the first companies in Australia to be using 3D printing. Steve, my godfather, showed me the ropes. I created a sea horse for my year 11 art portfolio, printed it and painted it. I instantly fell in love."

At first, Atkinson began learning by watching the available tutorials on ZClassroom. When her parents realised how well she was doing for a beginner, they helped organise online classes from UArtsy, where Atkinson's tutor is Ryan Kingslien himself.

Today, Atkinson's typical workflow typically starts with a sphere, and favourite brushes include the Clay brush and Slash 3 Brush. "Another thing I love is Dynamesh," she continues, "to be able to pull out a form from just a sphere is amazing!"

When asked how she hopes the industry could change for the future, Atkinson reveals a multitude of ideas, including 3D tools being used in the medical industry so that doctors would be able to scan a patient and visualise them inside out, with their skeletal structure, muscles and veins in high definition.

"I would adore to work as a freelancer or even a 3D teacher," she explains to us. "I would love to travel with my 3D art and be a part of a big 3D artist team to create a masterpiece."

At this rate, we definitely believe it will be no time at all until this dream is a reality.

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Astropad lets the Mac and iPad work as a connected space, with any app that's on the Mac desktop being mirrored on the iPad

Use your iPad as a pro graphics tablet

Transform your iPad into a creative powerhouse tablet with the help of your Mac and the new Astropad app

Developed by ex-Apple engineers Matt Ronge and Giovanni Donelli, Astropad presents an exciting new way to use an iPad together with a Mac as one whole connected workspace. To turn an iPad into what is a genuinely impressive professional graphics tablet, all users need to do is download Astropad both on their Mac and iPad. The iPad will then be able to function as a tablet by simply connecting to the Mac, either through USB or completely wirelessly with Wi-Fi, for the creative freedom to draw from the sofa.

The iPad will be able to work with and mirror any application on the Mac's desktop, with no drivers required, as well as support for most styluses. Best of all, you can pinch to zoom or pan with the iPad while in those Mac apps. A new technology Ronge and Donelli have called LIQUID even allows for fluid responsiveness as well as ensuring the iPad stays true to the original source with colour-corrected output and Retina resolution to match the Mac it's connected to.

Astropad for Mac is available now for $49.99 (£34.08), or $19.99 (£13.63) for academic users. The iPad app is free in the App Store. Learn more or start a seven-day free trial at astropad.com.

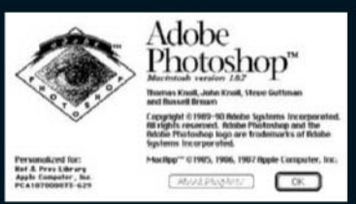
Ronge and Donelli met at Apple in 2007, when Ronge worked on QuickTime and Donelli on Mac OS X. They aim to build professional tools that work across Macs, iPads and iPhones

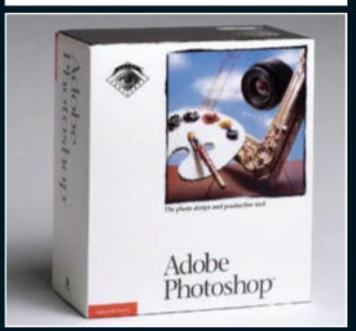
Photoshop turns 25

Adobe celebrates milestone birthday with showcase

First born as a simple program to showcase greyscale images on a black-and white monitor by ILM's John Knoll and his brother, Thomas, Photoshop is now one of the most recognised software brands in the world with tens of millions of users. To celebrate this milestone, Adobe – having licensed Photoshop since 1989 and given it its name – is showcasing the most creative artists under 25 who use Photoshop over the coming months. The company has also launched an advertising campaign, Dream On, as a tribute to the last 25 years of amazing art created in the imaging software.

"Adobe thought we'd sell about 500 copies of Photoshop a month," said Thomas Knoll, Adobe fellow and Photoshop co-creator. "Not in my wildest dreams did we think creatives would embrace the product in the numbers and ways they have. It's inspiring to see the beautiful images our customers create, the careers Photoshop has launched and the new uses people, all over the world, find for Photoshop every day."





If you're younger than Photoshop and want to enter the showcase, upload a project on Behance and use the tag 'Ps25Under25'

HAVE YOU HEARD? DreamWorks Animation is to sell and then lease back its studio in Glendale to help with liquidity

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Autodesk buys Tweak Software

Tweak staff will be working as a unit with the Shotgun team

Tweak Software, the developers of RV – an image and sequence playback tool, has been acquired by Autodesk. Tweak will be joining forces with Shotgun Software to develop new tools for advance review and collaboration technology for visual effects, games, and animation artists and their supervisors. The Tweak team will be joining Autodesk and will continue to work together as part of the Shotgun team. As well as their work with Autodesk, the Tweak team will also continue to develop, support and sell the RV tool which is currently available as version 4.0.

Tweak enables the review of elements such as playback, colour, and stereo and high frame rates

Paul Franklin with the BAFTA for *Interstellar*. The team's work on the black hole in the film even led to the recent publication of two scientific papers

3D printing helps disabled children

Artists create 3D printable rewards for new Kickstarter campaign 'Andiamo Adventures'

Andiamo, an award-winning startup that uses 3D printing to help build body supports for children with physical disabilities, has launched a new Kickstarter campaign to get more families into its incredible service and improve lives around the world.

Today, children who need body supports have to be covered in plaster to make a mould, held still for an hour as it dries and then have the mould sent away for production. Andiamo aims to change this by using 3D printing and scanning technology – reducing waiting times for support from 28 weeks to 48 hours. Anyone who supports the campaign with at least £10 will be able to claim their own 3D printable charm rewards, limited edition pieces of artwork and more, made by the artists Amalia Ulman and Lorenzo Quinn.

Visit the Andiamo Adventures Kickstarter campaign at **kickstarter.com/projects/nrparvez/andiamo-adventures**

Interstellar wins Academy Award

Double Negative certainly has a lot to celebrate this year with both a BAFTA and Oscar win

After being presented the BAFTA for Best Special Visual Effects for their work on Christopher Nolan's *Interstellar,* Dneg VFX supervisors Paul Franklin and Andrew Lockley have even more to celebrate with the Academy Award for Best Special Effects win under their belt too. Involving the use of only one green screen, the creation of *Interstellar*'s effects included the most accurate depiction of a black hole and wormhole yet seen as inspired by the work of leading astrophysicist, professor Kip Thorne.

Software shorts

Bringing you the lowdown on product updates and launches

Substance Designer 5

Allegorithmic has announced Substance Designer 5. New features include Substance Engine 2.0 and a new Pixel Processor node. Buy an indie licence for $99 and a pro licence for $590 at **allegorithmic.com/products/substance-designer**.

KeyShot 5.2

The final point release for KeyShot 5 and available immediately for download as a free upgrade to all customers with subscription, KeyShot 5.2 addresses performance and stability as well as including support for SOLIDWORKS 2015. Learn more at **keyshot.com**.

Mixamo 2.0

Mixamo has launched a new version of its quick online 3D character creation service. The new service includes major updates such as streamlined user experience, improved search capabilities and a WebGL viewer. Sign up for a new account at **mixamo.com/signup**.

RebusFarm 2.0

RebusFarm GmbH has just announced the new RebusFarm 2.0, a new render experience for a smarter workflow. Features include faster upload and download, secure file tranfers via sftp and added firewall compatibility. Read more on **rebusfarm.net/rebusfarm2-0**.

DID YOU KNOW? Former Rhythm & Hues owners have been sued for alleged mismanagement, which led to its bankruptcy

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Job Senior mathematician
Website www.sidefx.com
Location Canada
Biography When Mark completed university he wrote a ray tracing renderer using an Amiga 1000. This got him hired at Side Effects, at a time when the company was starting to focus on the production of its own software, PRISMS. He has now worked at Side Effects for over 25 years, has been integral in the creation of Houdini, and has also been awarded an Oscar for his work on three different occasions.
Portfolio Highlights
1990-2015 All major Houdini releases

Mark Elendt

Senior mathematician, Side Effects Software

We talk to the Oscar-winning, program-writing effects genius about his 25 years at Side Effects

Mark Elendt has a long and illustrious career in the visual effects industry. He has worked as a mathematician and programmer with Side Effects Software for over quarter of a century, been an integral member in the creation of Houdini, received awards from the Academy of Motion Picture Arts and Sciences three times, and has become chair of the SIGGRAPH Dailies program. We sat down to discuss the developments that have brought us to Houdini 14 today.

How have you seen Houdini evolve over the past 25 years?
When I started at Side Effects in the early Nineties we had a very small user base. At that time, to be a CG artist, you had to be a bit of a polymath. You had to have a clear knowledge of programming, mathematics, UNIX system administration, and you had to be an artist to boot.

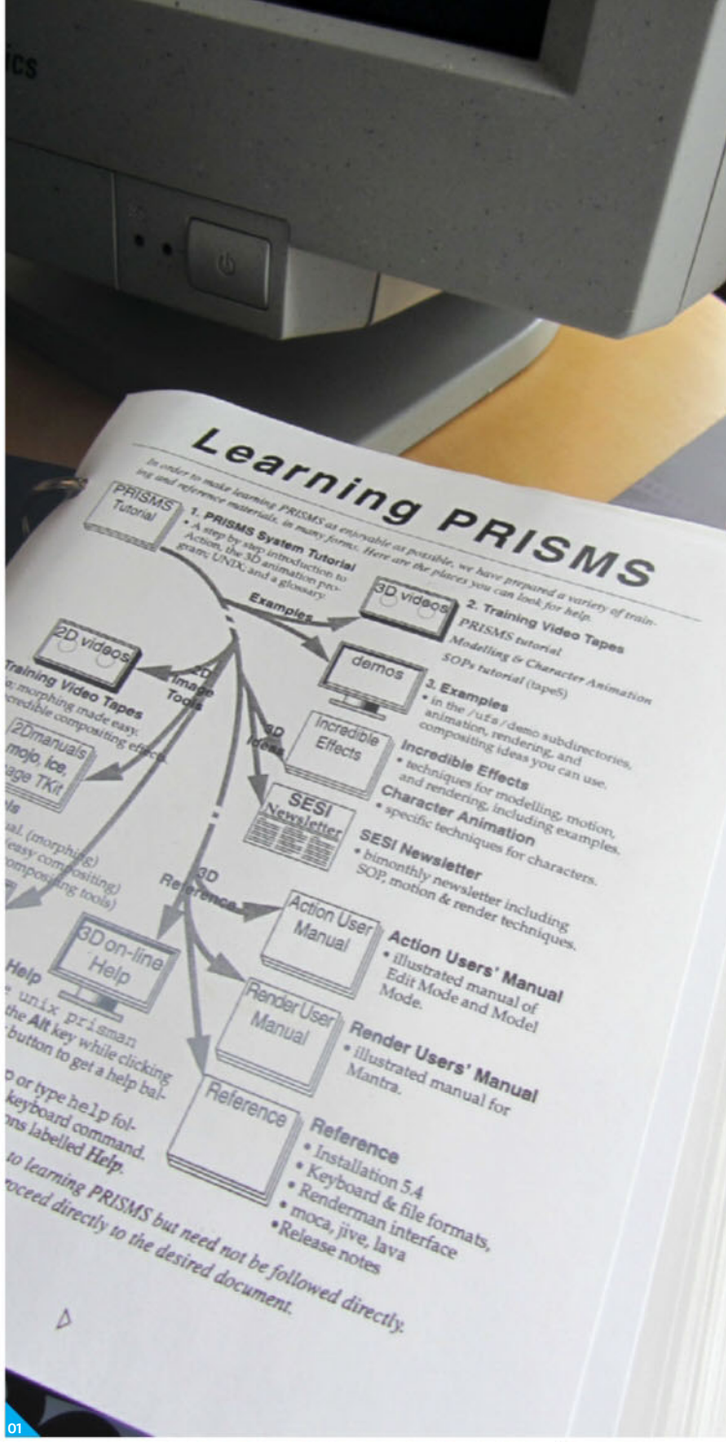
Over time artists have specialised as modellers, lighters, riggers or animators. While Houdini has all the tools needed to model, rig and animate, the software is a lot more accessible than other specialised software. When we innovate or add new features, our first goal is to make the technology open and flexible so artists never get stuck. If I had to enumerate some of the ground-breaking changes in software, they'd probably be the OP paradigm – the core technology in Houdini and the VEX programming language intended to be easy to use for artists, physically based rendering, and dynamic operators.

What achievements are you most proud of in this time?
It goes without saying that I'm terribly proud of the scientific and technical Academy Awards I've received from AMPAS. These awards really mean a lot to me. You wouldn't believe the amount of research that AMPAS does before it decides to give an award. It's really an honour to be recognised in this way.

But there are a lot of other special moments. One of the biggest thrills I get is seeing artists take our software and create such beautiful images. There's a real craft to creating CG.

What do you think will be the next ground-breaking achievements for VFX?
I think a big change will be the adoption of massive multicore machines and more adoption of GP/GPU technology. At Side Effects, we're fortunate to have a 120-core machine available for testing. While this kind of technology may not necessarily increase the complexity of shots, more cycles will certainly help shorten iterations, which will lead to higher-quality shots.

A trend I've noticed in the past few years is the accuracy and realism in creating effects. While this kind of work is being done all over, it can be highlighted by Double Negative's rendering of the black hole for *Interstellar*. I loved the fact that the effects artists saw a weird glow in their images and thought there was a bug in their renderings. But when an astrophysicist saw them, he had this 'eureka!' moment and realised something new about the physics of black holes. Having effects animation reveal new insights in astrophysics is amazing.



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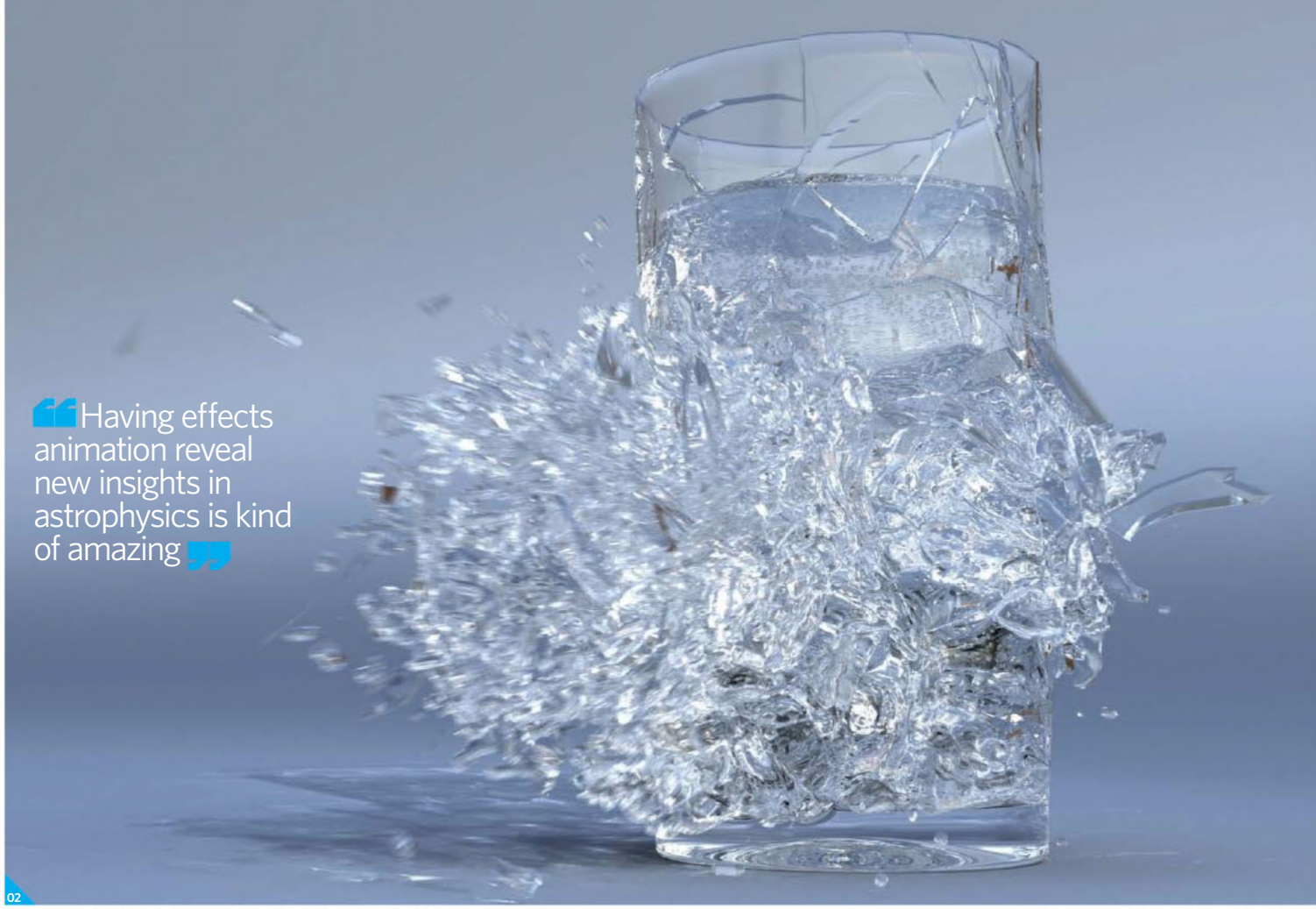

> Having effects animation reveal new insights in astrophysics is kind of amazing

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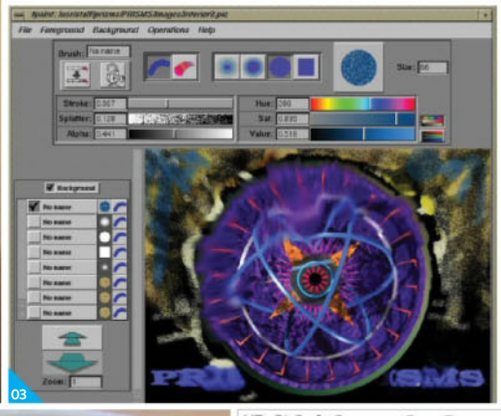

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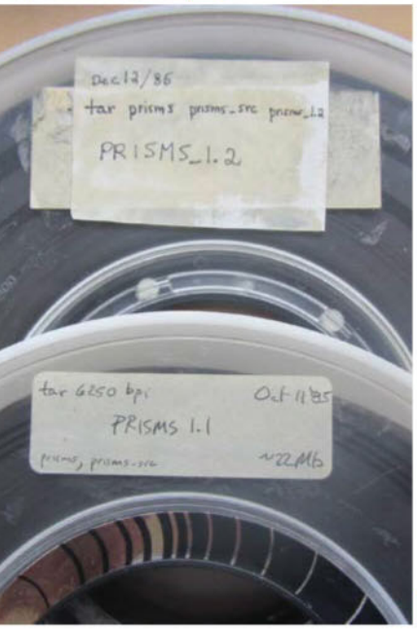

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Innovation at SIGGRAPH

Mark discusses his time as a SIGGRAPH Dailies chair and some of the work that he's seen

"Some of the standout [Dailies] presentations have included a student rigging job, how a three-year-old helped solve a lighting problem on Pixar's Blue Umbrella, some amazing scientific visualisations, an artist who created tentacles for a music video...

"The dailies are very open and accessible for presenters. There aren't many places where you see students presenting their work alongside top artists from Pixar, Naughty Dog, Disney and DreamWorks."

01 "After 25 years, I still get excited about new developments"

02 "It's kind of funny that now computers are so much faster, the average time for a rendered frame has actually increased. The quality demanded of artists today is unbelievable"

03 "A lot of people say 'rendering is a solved problem' – I still think there's a lot of interesting work to be done"

04 "I've been to every SIGGRAPH since Dallas 1990 (except for Boston 2006). It's a great place to see the latest research and production techniques"

05 "High-quality computer graphics is something we all take for granted"

06 "We sometimes recognise a shot [in a movie or game for example] that went through support. It's always exciting to see the result of your efforts in the final imagery"

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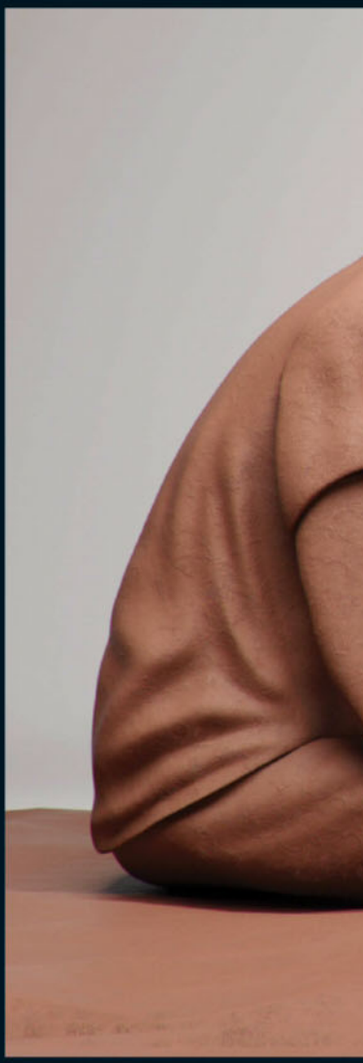

Images of the month

These are the 3D projects that have been awarded 'Image of the week' on 3DArtistOnline.com in the last month

01 No Symmetry
by Oliver Kieser
3DA username DigitalDream
Oliver says: "This abstract image was created in ZBrush 4R7, with postproduction work completed in Photoshop Elements 13."
We say: *This is the second time we've featured Oliver here, after his last work wowed us last month. He has such a unique style, and it's great to see someone making the most out of ZBrush 4R7.*

02 On Saturdays We Used to Sleep
by Andrey Mikhalenko
3DA username Mikhalenko
Andrey says: "All models are my own. All fabric was modelled using Marvelous Designer. It was rendered and modelled in 3ds Max and V-Ray. Post-production was carried out in Photoshop. I wanted to create a light, romantic image."
We say: *Andrey has done a superb job creating a fantastic living space that stands out from other arch-vis renders.*

03 My Only One
by Guzz Soares
3DA username Guzz Soares
Guzz says: "This project is based on Zac Retz concept art, and it's about the first love and the first kiss as well."
We say: *Guzz's ode to love is a fantastic sculpt and evokes so many emotions, making it a very special project. The rips on the jeans adds some subtlety to the piece. We love the innocence and purity of the image – it contributes massively to its appeal.*

04 Old Man
by Sudhir Verma
3DA username Sudhir Verma
Sudhir says: "This old man image was created as a test for the Lbrush painting tool for Maya. You can find the speed video at youtu.be/7ZB2QpQs-OU."
We say: *This stunning example of photorealism caught our eye immediately, with the level of detail around the skin in the nose and mouth areas a particular highlight. The dents across the face feel almost touchable.*

02

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Image of the month

03

04

The Golden Jetpack

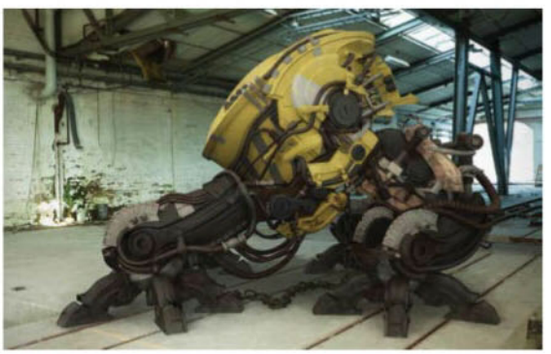
by Michel Lanoie
3DA username Kingpoby

Michel says: "This fellow just set a bomb on a spaceship, unnoticed. As the bang goes off, he thinks about the good work he just did and will never have to look back!"
We say: *This is such a fun image that we had to include it! Check out Michel's other work – he's an environment artist who worked on one of our favourite games,* Deus Ex: Human Revolution.

Cello – Abstract design **by Niels Prayer**

3DA username Nielsprayer

Niels says: "A procedural simulation of particles, curves and fluid based on a cello shape, using Houdini and rendered in Mantra."
We say: *Niels has generated a wonderful abstract piece in Houdini, and demonstrates a keen eye for artistic simulations. We'd love to see more pieces like this in the future.*



Guard **by Vahid Ghobadi Arfaei**

3DA username Vahid

Vahid says: "I watched this awesome concept on the Gnomon website. It's made by Jeremy Cook. I decided to make it with 3ds Max. I used 3ds Max, V-Ray and Photoshop and it's only my second experience of hard surface modelling."
We say: *For Vahid's second attempt at hard surfaces, we think that he's done really well. This is a really interesting concept.*

Composition #7 **by Juan Siquier**

3DA username Siquier

Juan says: "This scene represents my comfort zone. It's the kind of scene I like to do and enjoy most, I mean, the interior is very old, but not sloppy and still in use."
We say: *We love the rustic, antique feel that Juan has achieved with this image, and the small details such as the photos on the wall and the piggy bank really elevate it to new heights.*

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- Blacksmith3D trial for Mac and Windows
- Video tutorial for Poser Pro from Renderosity
- 25 Textures from 3DTotal
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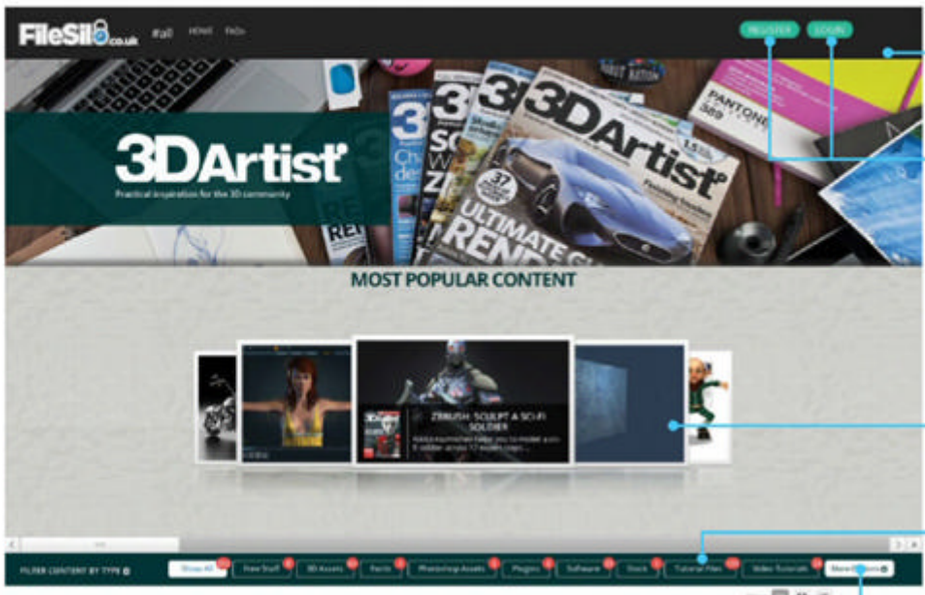

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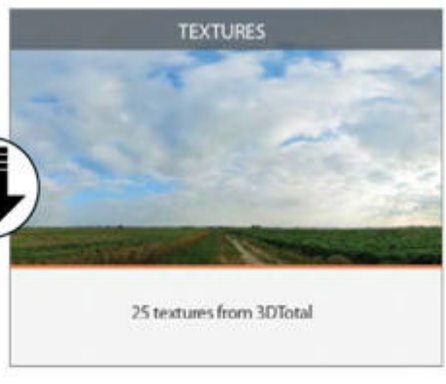
Creating cartoony characters in Cinema 4D

Trial version for Mac and Windows



25 textures from 3DTotal

NEED HELP WITH THE TUTORIALS?

Having trouble with any of the techniques in this issue's tutorials? Don't know how to make the best use of your free resources? Want to have your work critiqued by those in the know? Then why not visit the **3D Artist** Facebook page for all your questions, concerns and qualms? There is a friendly community of fellow 3D artists to help you out, as well as regular posts and updates from the magazine team. Like us today and start chatting!

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Issue 80 of **3DArtist** is on sale **22 April 2015** from **GreatDigitalMags.com**

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